U.S. DEPARTMENT OF THE INTERIOR

OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

I 1.94/2:

TELINOIS STATE LIBRARY

SEP 22 1976 SEP 22 1976

Springfield, Illinois

SELECTED

SWATERRESOURCES ABSTRACTS



VOLUME 6, NUMBER 4 FEBRUARY 15, 1973 SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is \$22 (domestic), \$27.50 (foreign), single copy price \$3. Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior



VOLUME 6, NUMBER 4 FEBRUARY 15, 1973

W73-01951 -- W73-02600

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the Water Resources Thesaurus. Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCU-MENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established disciplineoriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Rioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center Office of Water Resources Research U.S. Department of the Interior Washington, D. C. 20240

CONTENTS

| FOREWORDii |
|------------|
|------------|

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE

Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION

Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL

Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION

Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING

Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development. 01. 1B.

PRO Insti S. Si Avai

Desc

tract tropy Phys Free Iden Lant

The base liqui crea remethe the the plies mec water

FRO AN. ANI MO Pur Res M. Av: tior \$0.9 Res 24, OW

Des rela *Da *W sys

07 RESOURCES DATA

Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS

Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS AND FACILITIES

Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION

Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

Wi

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

PHYSICAL CHEMISTRY OF EXTRACTION

PROCESSES, Institute of Nuclear Research, Warsaw (Poland).

S. Siekierski.
Available from the National Technical Informa-tion Service as INR-P-1339, \$3.00 in paper copy, \$0.95 in microfiche. Report No CONF-700540-1, 1971. 8 p, 3 ref.

Descriptors: "Separation techniques, "Solvent extractions, "Thermodynamic behavior, "Salts, Entropy, Ions, Mathematical models, Electrolytes, Physicochemical properties, Chemical analysis, Free energy, Pollutant identification, Solvation. Identifiers: *Ion pairing, *Metal chelates, Lanthamum, Tributylphosphate, Sample prepara-

The thermodynamics of the extraction process, based on the modern theory of the structure of liquid water has been discussed. A significant inliquid water has been discussed. A significant increase in the entropy of the system due to the removal of an uncharged organic molecule from the aqueous phase, connected with the change of the structure of water, is a main factor determining the transfer of the molecule from the aqueous to the organic phase. The model described can be applied to the description of the extraction mechanism of metals in the forms of chelates, solvated salts and ion-pairs. (Long-Battelle) W73-02014

MOBILITIES OF INJECTED IONS IN LIQUID

MATER, Missouri Water Resources Research Center, Rol-

For primary bibliographic entry see Field 05A. W73-02114

STRUCTURAL ASPECTS OF AMIDE-WATER

SYSTEMS, Connecticut Univ., Storrs. For primary bibliographic entry see Field 05A. W73-02343

02. WATER CYCLE

2A. General

A PROGRAM FOR ESTIMATING RUNOFF FROM INDIANA WATERSHEDS, PART III ANALYSIS OF GEOMORPHOLOGIC DATA AND A DYNAMIC CONTRIBUTING AREA MODEL FOR RUNOFF ESTIMATION, Purdue Univ., Lafayette, Ind. Water Resources Research Center.

M. T. Lee, and J. W. Delleur.
Available from the National Technical Information Service as PB-213 190, \$3.00 in paper copy, \$0.95 in microfiche. Indiana Water Resources Research Center, Lafayette, Technical Report No. 24, 1972. 144 p, 51 fig, 18 tab, 66 ref, append. OWRR B-008-IND (10).

Descriptors: *Small watersheds, *Rainfall-runoff relationships, *Hydrographs, Drainage patterns, *Drainage density, *Geomorphology, *Watersheds (Basins), Base flow, Drainage systems, Hyetographs, *Indiana, *Model studies.

An integrated model of the rainfall-runoff process An integrated model of the ramain-runoit process as it applies to watersheds of Indiana is described. The model considers watershed characteristics, rainfall patterns and climatic conditions. The analysis of stream network data indicates that small In-

diana watersheds obey the Strahler and Shreve or-dering system. Drainage area, drainage density and basin slope are the major watershed parameters. A contributing drainage area distribution curve along the stream reaches was developed for the purpose of runoff estimation. A linear three parameter method was used to route the conparameter method was used to route the contributed runoff through the drainage area distribution curve. Based on the dynamic area model and the linear routing technique, a runoff simulation model is proposed. The basic input information required is the rainfall hyetograph, the base flow, the daily minimum temperature, the soil index and drainage and topographic maps. The model performance is compared with some of the other methods currently used in engineering design. W73-01952

DELAY OF RUNOFF FROM A GLACIER

BASIN, Uppsala Univ. (Sweden). Dept. of Physical Geography.

For primary bibliographic entry see Field 02C. W73-02048

REPRESENTATIVE RURAL CATCHMENTS IN KENYA AND UGANDA, Road Research Lab., Crawthorne (England).

Rotal Research Laboratory Report LR 318, 1970. 33 p, 2 fig, 9 plate, 1 tab, 13 ref, append.

Descriptors: *Rainfall-runoff relationships, *Demonstration watersheds, *Stream gages, *Data collections, *Hydrographs, Africa, Topography, Variability, Peak discharge, Design flow, Culverts, Instrumentation, Small watersheds. Identifiers: *Kenya, *Uganda, *Representative

Networks of small rural catchments are studied throughout Kenya and Uganda to provide data for the design of waterway sizes for small bridges and the design of waterway sizes for small bridges and culverts. The program is being run jointly by the Kenya and Uganda Governments and the Road Research Laboratory of the United Kingdom Ministry of Transport. The six catchments in each country are described. They are sited to provide information on the effect on the runoff hydrograph of area, spatial and temporal rainfall varia-bility, topography and soil type, and effects of swamps. For each catchment a rainfall runoff correlation and unit hydrographs are calculated.

These are correlated with the catchment parameters to estimate flood flows for ungaged catchments. (Knapp-USGS)
W73-02050

FORMATION AND CALCULATION OF ELE-MENTS OF THE WATER BALANCE FOR SMALL WATERSHEDS OF NORTHERN KAZAKHSTAN (FORMIROVANIYE I RASCHETY ELEMENTOV VODNOGO BALAN-SA MALYKH VODOSBOROV SEVERNOGO SA MALYKH VODOSBUROV SEVERAL KAZAKHSTANA).
Gosudarstvennyi Gidrologicheskii Institut, Lenin-

Gidrometeoizdat, Leningrad, I. B. Vol'ftsun, and K. I. Smirnov, editors, 1971. 159 p.

Descriptors: *Water balance, *Small watersheds, Forest watersheds, Agricultural watersheds, Drainage area, Meteorology, Precipitation (Atmospheric), Snow, Melt water, Discharge (Water), Surface runoff, Overland flow, Evaporation, Moisture content, Water storage, Groundwater, Water table, Soils, Seasonal, Equations.

Identifiers: *USSR, *Kazakhstan, Water-balance method, Water-balance equation, Chronoiscoleths

method, Chronoisopleths.

Results are presented of investigations carried out by the Leningrad State Hydrologic Institute at the Kustanay Hydrometeorological Station in northern Kazakhstan in 1960-69. Water-balance elements examined include precipitation; snow cover, surface runoff; overland flow; evaporation from soil and free-water surfaces; soil moisture content and water storage; and groundwater. The possibility of using the water-balance method is considered to obtain estimates of water storage in loam and clay watershed soils for below-average moisture conditions during a warm season. (Josefson-USGS)

METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD, National Weather Service, New Brunswick, N.J.

D. V. Dunlap.

Water Resources Bulletin, Vol 8, No 5, p 1044-1054, October 1972, 4 fig. 1 photo, 5 tab.

Descriptors: *Floods, *New Jersey, *Hurricanes, Rainfall-runoff relationships, Antecedent precipitation, Peak discharge, Flood peak, Disasters, Meteorology.
Identifiers: Hurricane Doria (1971).

The meteorological patterns that produced the combination of heavy rains in August 1971 that resulted in record floods in New Jersey are described. Daily and hourly precipitation data and selected recurrence frequencies of rainfall amounts are tabulated. History of previous heavy rainfalls in New Jersey indicates that occurrences of very heavy rains are frequently associated with tropical disturbances. Flood damages, fatalities, warnings issued and areas of record river stages are summarized. The floods can probably be con-sidered as first a flash flood, then minor flooding associated with antecedent rainfall, a severe flash flood from Tropical Storm Doria, and finally a record-breaking flood from the combination. (Knapp-USGS) W73-02174

NONPARAMETRIC STATISTICAL METHODS IN URBAN HYDROLOGIC RESEARCH, Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04C.

A WATER QUALITY MODEL FOR A CON-JUNCTIVE SURFACE-GROUNDWATER
SYSTEM: AN OVERVIEW,
Florida Univ., Gainesville. Dept. of Environmental Engineering. For primary bibliographic entry see Field 05B.

RESERVOIR YIELD IN ARID REGIONS WITH

RESERVOIR TIELD IN ARID REGIONS WITH LIMITED RECORDS, Lund (G. G. A.), Johannesburg (South Africa). B. G. A. Lund, and K. S. Bylsma. The Civil Wengineer in South Africa, Vol 14, No 4, p 153-161, April 1972. 9 fig, 1 tab, 6 equa, 15 ref.

Descriptors: *Reservoir yield, *Arid climates, *Rainfall-runoff relationships, *Simulation analysis, Equations, *Interception, Reservoir design, Optimization, Water balance, Soil moisture, Water quantity, Meteorological data, Hydrological data, Computer programs, Physical properties, Surface runoff, Model studies.

Guiner Hungi, Model Studies. Identifiers: "South Africa, "Rhodesia, Shashi River basin, Groot Marico, Bierspruit, Western Transvaal, Soil cover reservoir, Iterative procedures, Catchment wetness.

Group 2A-General

A method is presented as a practical solution to the problem of reservoir yield determination in arid areas where there is a paucity of hydrological and meteorological data. By examining the physical characteristics of the catchment, surface runoff is related to rainfall and catchment wetness. The latter is determined by the quantity of water held in the soil cover reservoir, the area of which extends over the entire catchment and the depth of which is defined by the average depth to which evapotranspiration effects the depletion of this reservoir. Results show that short-term runoff records can be extended with confidence. The extended record is used in a simple and rapid method records can be extended with contidence. The ex-tended record is used in a simple and rapid method to determine the optimum design of a reservoir. Synthesized monthly inflow figures will often differ considerably from the actual figure. How-ever, the ultimate object is the estimation for a designated failure rate of either the maximum designated failure rate of either the maximum draft from a reservoir or an optimum size of reser-voir for a predetermined draft. The reservoir storage will tend to damp out monthly discrepan-cies. The catchment model can be improved if ad-ditional meteorological data and longer gauge records are available. Failing this, however, it pro-vides a reasonable reliable result for its intended purpose. (Bell-Cornell) W73-02545

HYDROLOGIC MODELING, Illinois Univ., Urbana. Dept. of Engineering.

V.T. Chow.

Journal of the Boston Society of Civil Engineers,
Vol 59, No 1, p 1-27, January 1972. 6 fig, 34 equa,

Descriptors: *Hydrologic systems, *Model studies, Classification, Linear programming, Stochastic processes, *Input-output analysis, *Hydrograph analysis, Certainty, *Forecasting, Analog models, Simulation analysis, Computers, Risks.

Identifiers: Lumped-system models, Distributed-system models, Non-linear programming, Proba-bilistic processes, *Deterministic models, *In-deterministic models, Scale models, Prediction.

Since exact laws governing most natural hydrolog-ic phenomena have not yet been fully discovered, these complicated phenomena can only be approxthese complicated phenomena can only be approximated by modeling. In recent years, a host of so-phisticated hydrologic modeling techniques have been developed. Herein, hydrologic models are classified into various types according to certain simplifying assumptions. They are divided into wo basic categories: (1) physical (scale, analog, and simulation models); and (2) abstract (deterministic action of the control of the con ministic and indeterministic models). Abstract models replace the relevant features of the hydrologic system by a set of mathematical rela-tionships. Deterministic and indeterministic models may be differentiated by considering the may be differentiated by considering the concepts of certainty and uncertainty; deterministic models make forecasts, while indeterministic models make predictions. The abstract models are discussed in detail and examples are given. (Bell-Cornell) W73-02547

AN EXPERIMENT IN MODELING ROCKY MOUNTAIN FOREST ECOSYSTEMS, Northern Arizona Univ., Flagstaff.

I. R. Jones

US For Serv Res Pap Rm. 75. p 1-19. 1971. Illus.

Maps.

Maps.

*Aspen D, Ecosystems, *Forest ecosystems, Model studies, Moisture, Mountains, ecosystems, ecosystems Precipitation (Atmospheric), *Regression analysis, *Rocky Mountains, Temperature.

This prototype model consists of a temperature regime ordinate, a moisture regime ordinate, and a regression equation relating them to aspen site index in the Southern Rocky Mountains. Its construction required a close look at a number of

problems and considerations, and some possible methods, in ecosystem modeling. Clonal variation in aspen height growth prevented a good test of the model, however. The temperature regime ordinate is analogous to degree-days, and integrates elevation and latitude within subregions. The moisture regime ordinate integrates estimates of monthly precipitation, monthly mean temperatures, potential direct-beam insolation, water-holding capacity of the soil, and factors influencing runoff. Equations are provided for estimating mean monthly precipitation, based on topographic and other factors.—Copyright 1972, Biological Abstracts, Inc. W73-02566

2B. Precipitation

HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE, National Weather Service, Silver Spring, Md. For primary bibliographic entry see Field 07A. W73-02036

METEOROLOGICAL AND HYDROLOGICAL ANALYSIS OF THE AUGUST 27-28, 1971, NEW JERSEY FLOOD, National Weather Service, New Brunswick, N.J. For primary bibliographic entry see Field 02A. W73-02174

AN EXPERIMENT IN MODELING ROCKY MOUNTAIN FOREST ECOSYSTEMS, Northern Arizona Univ., Flagstaff. For primary bibliographic entry see Field 02A. W73-02566

WEATHER VARIATIONS ON A MOUNTAIN GRASSLAND IN SOUTHWESTERN MONTANA, Forest Science Lab., Bozeman, Mont. W. F. Mueggler.

U S For Serv Res Pap Int. (99). p 1-25. 1971. Illus. Identifiers: *Montana, *Mountain grasslands, *Weather data, Precipitation (Atmospheric).

Weather data collected on mountain grasslands during 5 growing seasons are summarized. These data are from 4 stations on opposing exposures (southwest and northeast) at different elevations (7100 and 8200 ft). Tabular and graphic data presented are for the station on the 7100-ft southwest exposure only. These data included presented are for the station on the 7100-ft southwest exposure only. These data include information on: solar radiation, wind, precipitation, air temperature, and relative humidity; exposed and shaded soil surface temperatures, and soil temperatures and moisture trends at 3 depths. Summaries include: means, ranges, extremes, and durations. Differences in weather on the 2 exposures and at the 2 elevations are discussed. Air temperature and precipitation records are comtemperature and precipitation records are compared with those obtained from 2 USA Weather Bureau stations located in nearby valleys.—Copyright 1972, Biological Abstracts, Inc.

THE CONTENT OF VARIOUS ELEMENTS IN

THE CONTENT OF VARIOUS ELEMENTS IN PRECIPITATION,
Institut National de la Recherche Agronomique,
Rouen (France). Station Agronomique.
For primary bibliographic entry see Field 02K.
W73-02588

2C. Snow, Ice, and Frost

ICE-CORED MORAINES IN BRITISH COLUMBIA AND SOUTHERN BRITISH COLUMBIA AND ALBERTA, CANADA, Stockholm Univ. (Sweden). Dept. of Physical G. Ostrem, and K. Arnold.

Geografiska Annaler, Vol 52A, No 2, p 120-128, 1970. 6 fig. 20 ref.

Descriptors: *Permafrost, *Aerial photography, *Terrain analysis, Glacial drift, Glaciers, Surveys, Mapping, *Canada, Photogrammetry, Glaciology, Geomorphology. Identifiers: *Ice-cored moraines.

Air photo interpretation can be used to identify ice-cored moraines. In southern British Columbia and Alberta, the distribution of various types of end moraine ridges was determined from medium and high altitude photographs and the results plotted on a map on the scale of 1:2,000,000. On the same map the glacier distribution was transferred from the Canadian glacier map. The height of the glaciation limit was also indicated on the map by contour lines. The proportion of ice-cored end moraines increases from the coast inland. The highest ratio of ice-cored end moraines is found in areas where the glaciation limit reaches its highest areas where the glaciation limit reaches its highest altitudes. These areas generally have the most con-tinental climate, and permafrost is found at high elevations. (Knapp-USGS)

FROST CRACKING IN THE COLORADO

FRONT RANGE, Colorado Univ., Nederland. Inst. of Arctic and Al-

Colorado Univ., Nederland. Inst. of Arctic and Al-pine Research. J. B. Benedict. Geografiska Annaler, Vol 52A, No 2, p 87-93, 1970. 7 fig. 11 ref.

Descriptors: *Frost action, *Colorado, *Frost heaving, *Alpine, Frozen soils, Ice, Soil water, *Rocky Mountain region. Identifiers: *Frost cracks.

Frost cracks above timberline in the Colorado Frost cracks above timberline in the Colorado Front Range occur in turf-banked lobes and teraces and in other areas where differential frost heaving is locally intense. Crack widths vary seasonally, becoming gradually wider during the fall and winter and narrower during the spring and summer. During 1965-66, seasonal variations in crack width at five experimental sites ranged from 0.7 to 8.6 cm. The locations, orientations, and aeasonal behavior of the cracks suggest that they are caused by tensional forces resulting from extreme and localized frost heaving. (Knapp-USGS) W73-02045.

THE ORIGIN OF FLUTED MORAINE AT THE FRONTS OF CONTEMPORARY GLACIERS, Wroclaw Univ. (Poland). Inst. of Geography. For primary bibliographic entry see Field 021. W73-02045.

SOME OBSERVATIONS ON SUPERIMPOSI-TION OF ICE ON THE DEVON ISLAND ICE CAP, N.W.T., CANADA, Department of Energy, Mines and Resources, Ot-tawa (Ontario). Polar Continental Shelf Project.

Geografiska Annaler, Vol 52A, No 1, p 57-67, 1970. 5 fig, 3 tab, 14 ref.

Descriptors: *Firn, *Glaciers, *Glaciation, *Cryology, *Ice, Precipitation (Atmospheric), Snowfall, Regimen, Stratigraphy, *Canada, Freezing, Melt water, Glaciology.
Identifiers: *Devon Island (Canada).

On ice caps, the zone of superimposed ice forma-tion is defined and divided into two subzones, one of continuous and the other of discontinuous su-perimposed ice formation. An annual increment may consist of a series of layers which can occur in various orders according to melting and freezing conditions during their formations. Laboratory analysis of superimposed ice did not reveal any valid method for division into annual layers.

Crysti

crysta mean edge a um lin

may b um lin W73-0

REDE Upps

hiera

cros

Crystal analysis shows an increase in the mean crystal size and the standard deviation from this mean with decreasing altitude between the firn edge and the equilibrium line. Below the equilibrium line the pattern is reversed. This phenomenon may be used to determine a long period equilibrium line. (Knapp-USGS) W73-02046 Crystal analysis shows an increase in the mean

BEDFORMS OF THE TANA RIVER, NORWAY, Uppsala Univ. (Sweden). Dept. of Physical Geography.

I. D. Collinson.

Geografiska Annaler, Vol 52A, No 1, p 31-56, 1970. 27 fig, 35 ref.

Descriptors: *Channel morphology, *Alluvial channels, *Ice breakup, *Sand bars, Dunes, Sediment transport, Sedimentary structures, Sedimentation, Scour, Sand waves, Ripple marks.
Identifiers: *Tana River (Norway), *Norway.

The greater part of the water and sediment discharge in the Tana River of Norway takes place discharge in the Tana River of Norway takes place in the weeks following the ice breakup and flood. During this time the river discharge changes rapidly. Sand is trasported as large, ripple-like bedforms (linguoid bars), though a whole hierarchy of bedforms can be recognized. These range from permanent islands and banks through side bars, linguoid bars, dunes, and ripples. Superimposition of dunes on the backs of linguoid bars, which has previously been used as a criterion for their separation into distinct classes of structure, is only found on exposed or shallowly submersed bars and is raper on deeply submersed. merged bars and is rarer on deeply submerged bars, suggesting that the dunes are a response to the lower water stage. During the falling stages of the river, the bedforms are modified by a combinathe river, the bedforms are modified by a combina-tion of falling-stage currents, waves, and wind ac-tivity. Ripples and dunes produce small and large scale trough cross-bedding respectively while the frontal parts of linguoid bars show tabular planar cross-bedded sets interbedded with ripple cross-laminated units. (Knapp-USGS) W73-02047

DELAY OF RUNOFF FROM A GLACIER BASIN, Uppsala Univ. (Sweden). Dept. of Physical Geog-

raphy. T. Stenborg.

Geografiska Annaler, Vol 52A, No 1, p 1-30, 1970. 16 fig. 3 tab, 40 ref.

"Water storage, "Glaciology, Snowmelt, Water balance, "Glaciohydrology, Hydrologic budget, Melt water, Melting, Ablation, Glaciology, Snowmelt, Water sources.
Identifiers: Delayed runoff. Descriptors: *Rainfall-runoff relationships,

A delaying effect is exerted on runoff by a glacier during the first part of the summer. The summer can be subdivided into three main periods. Period l exhibits a runoff deficit in relation to what may be expected from the amounts of water supplied by melting and rain, while period II involves a corresponding excess runoff through the release of stored and delayed water. Period III is a balanced period in the later part of the season, with a correspondence between the volumes supplied and discharged. Regression equations were used dur-ing period III to relate the daily water volumes generated to the meteorological reference parame-ters. They were also applied to the earlier periods for estimation of the water generation. Estimation of the recession factor by Markov analysis of the on the recession factor by Markov analysis of the measured discharges was also tested. A volume of water of the order of 25% of the total summer discharge is delayed from the early to the middle part of the summer. (Knapp-USGS) W73-02048 CIRCULATION AND HYDROLOGY UNDER THE SEASONAL ICE IN MCMURDO SOUND, ANTARCTICA, Department of Scientific and Industrial Research, Wellington (New Zealand). Oceanographic Inst.

New Zealand Journal of Marine and Freshwater Research, Vol 5, No 3-4, p 497-515, December 1971. 11 fig, 4 tab, 7 ref.

Descriptors: *Water circulation, *Currents (Water), *Sea ice, *Glaciers, *Antarctic, Water temperature, Salinity, Oceanography. *McMurdo Sound (Antarctica).

Measurements of current velocity, temperature and salinity were made at seven positions in Mcand salinity were made at seven positions in McMurdo Sound, Antarctica, four near the seasonalice to fast-ice boundary, two along the seasonalice sea boundary, and one in a channel in the sea
ice. Current velocities were strongly influenced by
tides with speeds greatest during periods of high
tidal range. Current velocities changed rapidly in
the upper 100 m and current speeds generally increased with depth to within 200 m of the bottom.
In the lower 200 m current speed decreased
towards the bottom. The mean circulation near the
seasonal-ice to fast-ice boundary, found by
eliminating the tidal variation, consists of an inflow of water towards the fast ice at positions
further than 1.3 km from Ross Island and a net outflow from under the fast ice at positions closer
than 1.3 km from Ross Island. (Knapp-USGS)
W73-02051

COMPUTING SALINITY PROFILES IN ICE, Saskatchewan Research Council, Saskatoon. L. Fertuck, J. W. Spyker, and W. H. W. Husband. Canadian Journal of Physics, Vol 50, No 3, p 264-267, February 1, 1972. 4 fig, 7 ref.

Descriptors: *Ice, *Freezing, *Salinity, *Cryology, Water chemistry, Thermodynamics, Water temperature, Temperature, Sea ice, Brines, Crystallography.

The ratio of ice salinity to brine salinity, k, was measured at temperature gradients up to 1.3 deg C/cm. The data fit the empirical equation C/cm. The data fit the empirical equation k=0.1+0.29 dt/dx. This equation was used in a digital simulation of the freezing process and the results were compared with data obtained in field experiments in a temperate climate. The computed ice salinities were within 25% of measured salinities at any level in ice having a horizontal caxis, and the computed average ice salinity was within 50 f the actual average ice salinity. (Knapp-USGS) W73-02054

ENGINEERING GLACIOLOGY (INZHENER-

NAYA GLYATSIOLOGIYA).
Izdatel'stvo Moskovskogo Gosudarstvennogo
Universiteta, Moscow, Tushinskiy, G. K., editor,

Descriptors: *Glaciology, *Glaciers, *Snow, *Ice, *Engineering, Engineering structures, Control structures, Hydraulic structures, Crystals, Snowstructures, Hydraulic structures, Crystals, Snow-packs, Avalanches, Mudflows, Sea ice, Fresh-water, Melt water, Heat balance, Properties, Per-mafrost, Regions, Project planning. Identifiers: "USSR, "Engineering glaciology, Snow structure, Snow compaction, Snow avalanches, Ice structure, Ice crystals, Ice con-trol, Glacier flow.

Useful applications of snow and ice and snow and ice control in different branches of the USSR national economy are discussed. The present state of knowledge regarding the structure and mechanical properties of snow and ice is outlined together with information on snow avalanches, glaciers, glacier mudflows, sea and freshwater ice, and icings ('naleds'). Special attention is given to site

conditions as they relate to project formulation and engineering practice. (Josefson-USGS) W73-02060

SNOW STRUCTURE AND SNOW REGIME OF THE WEST SIBERIAN TAIGA (STRUKTURA I REZHIM SNEZHNOY TOLSHCHI ZAPAD-MOSIBIRSKOY TAYGI), Institute of Geography of Siberia and the Far East, Irkutsk (USSR).

E. G. Kolomyts. Izdatel'stvo 'Nauka', Leningrad, 1971. 175 p.

Descriptors: *Cryology, *Snow, *Snow cover, *Snowpacks, *Crystals, Crystal growth, Crystallization, Crystallography, Sublimation, Water vapor, Temperature, Thermocline, Topography, vapor, temperature, inerinterine, Topography, Meteorology, Vegetation, Regions, Biomes, Seasonal, Snow surveys, Investigations. Identifiers: *USSR, *West Siberia, *Taiga, *Snow properties, *Snow crystals, Snow physics, Snow density, Snow metamorphism, Snow ripening, Snow distribution.

Metamorphism, ripening, and thermal quality as they affect crystal form, density, energy relation-ships, and other properties of a snowpack were in-vestigated in 1964-68 in the central and northern taiga of the West Siberian Lowland in Khanty-Mansiysk National District. Sponsored by the Institute of Geography of Siberia and Soviet Far East, Siberian Division of the USSR Academy of Sciences, snow surveying was performed in an area west of the Ob River bounded on the south by upper and middle reaches of the Konda River and on the north by the Malaya Sos'va River and lower reaches of the Severnaya Sos'va River. (Josefson-USGS) W73-02063

WATER-RETAINING FORCES OF THE CELLS WATER-RETAINING FORCES OF THE CELLS
OF WINTER WHEAT LEAVES AND TILLERING NODES WITH REGARD TO THEIR RESISTANCE TO SLOW FREEZING AND DESICCATION (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant

Physiology.
For primary bibliographic entry see Field 03F.

W73-02123

THE EFFECTS OF SELECTIVE EROSION BY OVERLAND FLOW ON THE ICE-PUSHED RIDGES OF UELSEN (COUNTY BENTHEIM.

GERMANY), Amsterdam Univ. (Netherlands). Lab. of Physical Geography and Soil Science. For primary bibliographic entry see Field 02J. W73-02157

SOME SEDIMENTOLOGICAL ASPECTS OF THE FLUVIOGLACIAL OUTWASH PLAIN NEAR SOESTERBERG (THE NETHERLANDS), Utrecht Riiksuniversiteit (Netherlands). Geological Inst.

For primary bibliographic entry see Field 02J. W73-02159

ON THE USE OF STABLE ISOTOPES TO TRACE THE ORIGINS OF ICE IN A FLOATING ICE TONGUE, Cold Regions Research and Engineering Lab.,

Hanover, N.H. A. J. Gow, and S. Epstein.

Journal of Geophysical Research, Vol 77, No 33, p 6552-6557, November 20, 1972. 2 fig, 2 tab, 20 ref. NSF Grant GA-12945.

Descriptors: *Sea ice, *Glaciers, *Stable isotopes, Provenance, *Antarctica, Freezing, Melting, Salinity, Sea water, Precipitation (Atmospheric). Identifiers: *Koettlitz Glacier (Antarctica).

Field 02-WATER CYCLE

Group 2C-Snow, Ice, and Frost

The floating shelf-like tongue of the Koettlitz glacier, which extends for a distance of approximatecier, which extends for a distance of approximate-ly 50 km into McMurdo Sound, Antarctica, has fish and other marine animals on its ablating sur-face. Stable isotope studies definitely confirm the fact that the lower half of the 50-km-long Koettlitz ice tongue is composed of sea ice up to 15 meters thick. This transformation is accomplished by the combined processes of ablation of the original gla-cial ice at the unpre-surface and fearing decial ice at the upper surface and freezing of sea water onto the bottom. Near the Daily Islands, the ice tongue is underlain directly by fresh water. This fresh water is shown by stable isotope analysis to be of marine origin and is derived most probably from the melting of old desalinated sea ice. (Knapp-USGS) W73-02168

MODEL OF PRESSURE RIDGE FORMATION

IN SEA ICE, Washington Univ., Seattle. Dept. of Aeronautics

and Astronautics.
P. R. Parmerter, and M. D. Coon.

Journal of Geophysical Research, Vol 77, No 33, p 6565-6575, November 20, 1972. 13 fig, 16 ref. NSF Grant GV28807.

Descriptors: *Sea ice, *Arctic, Topography, Ice, Mathematical models, Rheology, Computer programs, Simulation analysis, Plasticity, Viscosity, Mechanical properties. Identifiers: *Pressure ridges (Sea ice).

In a kinematic model of pressure ridge formation, the lateral and vertical motion of ice blocks is combined with a force balance and breaking stress calculation. A computer program encompasses several physical processes to simulate ridge formation in ice with thicknesses from 20 cm to 2 meters. The resulting profiles are compared with measured profiles. A calculated lower bound to the force required to form ridges is of the order of the forces that may result from wind loading on the totes that may result from wind unding of the ice. When the ridge model proceeds through many steps, a limit cycle is established that pro-vides a limiting height for ridges. This height de-pends on the thickness and strength of the ice. (K-mapp-USGS) W73-02172

SUMMARY OF CURRENT RESEARCH ON

SNOW AND ICE IN CANADA. National Research Council of Canada, Ottawa (Ontario). Associate Committee on Geotechnical

Technical Memorandum No 106, June 1972. 30 p.

Descriptors: *Snow, *Ice, *Projects, *Canada, *Administrative agencies, Reviews, Documentation, Publications, Bibliographies, Glaciers, Sea ice, Snow cover, Lake ice, Ice-water interfaces, Rivers, Soils, Engineering structures.

In the last decade, a marked increase in snow and ice research in Canada has created a need for improved communication between the various agen cies and committees concerned with it. All the committees or organizations concerned with snow and ice research are listed and current snow and ice research projects are summarized. The summary of research projects is based on information available in various research listings, surveys, and departmental reports. Project Categories include: Snow and Ice Properties and Processes, Snow and Ice (atmospheric), Snow Cover on Ground, Lake and River Ice, Sea Ice, Glaciers, Soils-Ice, and Engineering Structures. An author index to the current projects also is included. Regular snow and ice surveys undertaken in Canada by govern-ment and private agencies are tabulated. (Woodard-USGS) W73-02310

ROTARY DRILLING AND CORING IN PER-MAFROST: PART III, DEEP CORE DRILLING, CORE ANALYSIS AND BORE HOLE THER-MOMETRY AT CAPE THOMPSON, ALASKA, Cold Regions Research and Engineering Lab., Hanover, N.H. For primary bibliographic entry see Field 08B. W73-02312

RESEARCH PROJECTS IN GLACIOLOGY, Department of the Environment, Ottawa (On-tario). Inland Waters Branch.

Report Series No 23, 1972, 115 p.

Descriptors: "Glaciology, "Projects, "Programs, "Reviews, "Canada, Glaciers, Artic, Glacial drift, Glaciation, Mapping, Remote sensing, Aerial photography, Sounding, Instrumentation, Methodology, Exploration, Glaciohydrology, Icebergs, Ice-water interfaces, Snowpacks.

This is the fourth annual report of glaciological projects sponsored by the Canadian Government. It comprises the glaciology projects in the Water Resources Branch, Inland Waters Directorate, Department of the Environment. The report contains two parts: (1) a general review of the organization and objectives of the glaciological program within the Water Resources Branch and (2) a catalog of the water Resources Branch and (2) a catalog of 60 current projects with pertinent data on objectives, work in progress, previous work, future work, location, principal investigator, and cooperating agency. The Glaciology Division contains six sections: Artic Hydrology, Perennial Snow and Ice; Alpine and Snow Hydrology; Floating Ice; Ice Science; and Remote Sensing and Instrumentation. A separate unit comprises the Radio-Echo Sounding Project. (Woodard-USGS) W73-02314 W73-02314

AVERAGE WATER CONTENT OF SNOWPACK

IN MAINE, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W73-02326

RELATION OF ICE FREEZEUP DATES AND ICE-COVER DURATION TO ELEVATION AND CHANNEL SLOPES OF CARPATHIAN RIVERS (O SVYAZI SROKOV USTANOVLENIYA I PRO-DOIZHITEL'NOSTI LEDOSTAVA S VYSOTOY MESTNOSTI I UKLONAMI NA REKAKH KAR-

Ukrainskii Nauchno-Issledovatelskii Gi Meteorologicheskii Institut, Kiev (USSR). For primary bibliographic entry see Field 04A. W73-02337 PAT), Ukrainskii

FROST-HEAVING PRESSURES, Cold Regions Research and Engineering Lab., Hanover, N.H. P. Hoekstra, E. Chamberlain, and A. Frate. Research Report 176, October, 1965, 11 p, 12 fig.

Descriptors: *Freeze-thaw tests, Frost action, *Frost heaving, Soil dynamics, Soil mechanics, Friction, Particle size. Identifiers: Freezing front, Frost-susceptibility.

Upon freezing a saturated soil in an open system from the top down a considerable pressure develops. The pressure is the result of the surface energy of a curved ice-water interface. The curvature of the interface is necessary for ice to ture of the interface is necessary for ice to proliferate through the soil pores. The curvature is related to the pore size distribution of the soil. The test chamber is designed to minimize the friction of the soil with the wall. An accurate control of heat removal is obtained by thermoelectric cooling. A load cell placed on top of the sample is used to measure the pressure developed and at the same time prevents heaving of the sample. By measuring the pressure on a layered sample it can be shown that the pressure develops at the freezing front. The results on several soils indicate that the maximum pressure that develops has a characteristic value for each soil. For each soil used the water content versus tension curve is given and the maximum pressure is related to this curve. (Campbell-NWWA) W73-02371

DESIGN, EXECUTION, AND RESULTS OF A MESOSCALE SNOWSTORM MODIFICATION PROJECT, National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.
H. K. Weickmann.
Available from the National Technical Information Service as COM-72-10552, 33.00 in paper copy, 30.95 in microfiche. National Oceanic and Atmospheric Administration, Environmental Atmospheric Administration, Environmental Research Laboratories Technical Memorandum ERL APCL-15, May 1972. 54 p, 42 fig, 1 tab, 14

Descriptors: *Snowfall, *Weather modification, *Storms, *Cloud seeding, *Great Lakes, Investigations, Winter, Analytical techniques, Data collections, Meteorology, Cloud physics, Aircraft, Silver iodide, Temperature, Winds, Radar, Artificial precipitation, Nucleation, Model studies, Numerical analysis.

Identifiers: Mesoscale numerical model.

In the Great Lakes region of the U.S.A., shallow but intensive winter storms form through a com-bination of cold continental air moving over still unfrozen and even warm, large water surfaces. Depending on their trajectories over the lakes and their persistence, these storms may demand their persistence, these storms may dump large amounts of snow onto the downwind shorelines. amounts of snow onto the downwind snoremes. The natural freezing nuclei concentration causes the formation of heavily rimed crystals. Seeding increases their number and prevents riming, causing smaller crystal fall velocities and consequently a larger transport of snow downwind and away from the urban and industrial centers near the shores. The experiment is designed around a mesoscale numerical model and microphysical model of snow crystal formation. The execution model of snow crystal formation. The execution employs seeding from the ground and from the air, tracking of the seeding agent through the cloud system by an airborne freezing nucleus counter, and analyzing the silver iodide nuclei in the precipitated snow crystals. The analysis includes radar, surface observation stations, and airborne radar, surface observation stations, and airborne observations. Results indicate the capability to affect the snowfalls in the desired mode strongly depends on the cloud temperature, indicating that snowfall can be initiated, redistributed, or not be affected at all. (Woodard-USGS) W73-02483

MELTWATER GAGING PROGRAM PROJECT NO 1, APPROACH ROADS, TUTO AREA, GREENLAND.

Army Engineer Vicksburg, Miss. eer Waterways Experiment Station,

Available from NTIS, Springfield, Va., 22151 as AD-733 954, \$3.00 paper copy, \$0.95 microfiche. Miscellaneous Paper No 2-597, August 1963: 24 p, 3 fig, 6 plates, 9 photo, 2 tab.

Descriptors: *Melt water, *Snowmelt, *Ice, *Hydrologic data, *Arctic, Data collections, Summer, Gaging stations, Glaciers, Streams, Channels, Discharge measurement, Flow rates, Cold regions.
Identifiers: *Greenland.

Measurements of meltwater flow from the ice and snow cover were made at various gaging stations in the vicinity of the Ramp, Transverse, and Ac-

cess Road the summ water flo ments we streams i Road. Th about 120 August 2. July 12 at perature, cover, wi oints. P flow data USGS) W73-024

REWOR WEST IC PALARO Florida S gy. For prim W73-024

SOLAR LEAFLE Forest Northea For prim W73-025 IINDER.

SITES O Departm tario). R A. R. En Copeia. Identifie tion, Ra (Canada Leopard

in an ice the frog with sile includin from be their ex Observa ice.--Co W73-02

THE THE E OSAKA PEARA Hyogo Akashi For pris

2D. F THE I

WETL QUALI New H F. R. H Availal tion Se \$0.95 in

Streamflow and Runoff—Group 2E

cess Roads near Camp TUTO, Greenland, during the summer of 1958. The purpose of these mea-surements was to determine the amount of melt-water flow in the vicinity of the roads. Measure-ments were confined chiefly to total runoff from each of two areas, although an effort was made to measure the runoff from secondary meltwater measure the runoff from secondary meltwater streams immediately to the north of the Ramp Road. The minimum total flow observation was about 120 cfs and was observed at 1630 hours on August 2. Flow was slightly in excess of 100 cfs on July 12 at 1400 hours. Runoff was affected by tem-perature, which in turn was affected by tem-cover, wind velocity, and elevation of observation points. Procedures for obtaining better meltwater flow data in the future are outlined. (Woodard-USGS) W73-02486

REWORKED PALYNOMORPHS FROM THE WEST ICE SHELF AREA, EAST ANTARCTICA, AND THEIR POSSIBLE GEOLOGICAL AND PALAEOCLIMATOLOGICAL SIGNIFICANCE, Florida State Univ., Tallahassee. Dept. of Geolo-

For primary bibliographic entry see Field 02J. W73-02495

RADIATION ABSORPTION BY SOLAR KADIATION ABSORPTION LEAFLESS HARDWOOD FORESTS, Forest Service (USDA), Durham, N. Northeastern Forest Experiment Station. For primary bibliographic entry see Field 021. W73-02569

UNDER-ICE OBSERVATIONS OF WINTERING UNDER-ICE OBSERVATIONS OF WINTERING SITES OF LEOPARD FROGS, Department of Lands and Forests, Maple (Ontario). Research Branch.
A. R. Emery, A. H. Berst, and K. Kodaira.
Copeia. Vol 1972, No 1, p 123-126, 1972. Illus. Identifiers: *Frogs, Ice, *Leopard frogs, Predation, Rana-Pipiens, Trout, Wintering, *Ontario (Canada).

Leopard frogs (Rana pipiens Schreber) hibernating in an ice-covered pond in Ontario, Canada, were found to rest in small pits apparently excavated by the frogs. Frogs were sometimes lightly covered with sit and all were capable of some movement including swimming. This habit keeps the frogs from being buried in anoxic mud, but increases their expansive to greation by (jab. such as trout. their exposure to predation by fish, such as trout. Observations were made using SCUBA under the ice.—Copyright 1972, Biological Abstracts, Inc. W73-02583

THE HYDROLOGICAL CONDITIONS FOR THE HYDROLOGICAL CONDITIONS FOR THE ENTRY OF SAGITTA ENFLATA INTO OSAKA BAY: II. IN THE CASE OF APPEARANCE OF A COLD WATER MASS (IN JAPANESE),
Hyogo Prefecture Fisheries Experiment Station, Akashi (Japan).
For primary bibliographic entry see Field 02L.
W73-02587

2D. Evaporation and Transpiration

THE INFLUENCE OF THE NEW ENGLAND WETLAND ON WATER QUANTITY AND QUALITY, New Hampshire Univ., Durham. Water Resources

arch Center.

F. R. Hall, R. J. Rutherford, and G. L. Byers.

Available from the National Technical Informa-Avanage from the National Technical Informa-tion Service as PB-213 268, \$3.00 in paper copy, \$0.95 in microfiche. Research Report No. 4, May 1972. 51 p, 6 fig, 7 tab, 29 ref, append. OWRR A-015-NH (3) 14-31-0001-3229. Descriptors: "Wetlands, "Evaporation control,
"Water yield improvement, "Evapotranspiration,
Flood control, Freshwater marshes, Water analysis, Water chemistry, Water loss, Water management (Applied), Water storage, Hydrologic
budget, Non-structural alternatives, "New
Hampshire. Identifiers: Wetland management, Evaporation
reduction, Evapotranspiration equations.

An investigation was undertaken to determine the influence of an eleven-acre pond-wetland in southeastern New Hampshire on water quality and quantity. Hydrologic, meteorologic and chemical data were collected from field instrumentation and laboratory tests during the summers of 1969 and 1970. In 1969 water losses of about twenty inches 1970. In 1999 water tosses of about twenty inches were due mainly to evaporation and transpiration. Evapotranspiration from the vegetated area was 1.7 times as great as open water evaporation. Stream discharge was small. During June, July and August of 1970 an evaporation retardant was used on the open water surface. Open water evapora-tion was reduced by about 32 percent. The only major difference in field conditions between the two summers was that precipitation was several inches less in 1970. The water chemistry changes somewhat during the summer and early fall, but the data display considerable scatter with time and spatially at a given time. The water appears to represent a mixture of atmospheric precipitation and soil water that had been modified by factors such as microorganisms and organic activity. Total dissolved solids, pH, silica and alkalinity are relatively low whereas iron and organic coloring tend to be fairly high. W73-02116

FROSTHARDINESS OF APPLE TREES SCORED ACCORDING TO THE WATER RE-TENTION ABILITY OF LEAVES (IN CZECHOSLOVAKIAN), Vyzkumny Ustav Rastlinnej Vyroby, Piestany (Czechoslovakia).

B. Benko. Ved Pr Vysk Ustavu Rastlinnej Vyroby Piestanoch. 8. p 273-283. 1970. Illus. English summa-

ry. Identifiers: *Apple-D, *Frost hardiness, *Leaves, Trees, Water retention.

Four intervals of evaporation were chosen after cutting the summer shoots (4, 6, 24 and 30 hr). Two groups of cultivars reacting differently to winter frost were studied, Ontario and Reinette de Canada-susceptible and 'Malinove hornokrajske' and 'Yellow Transparent'-resistant. The differences between particular years were greater than the differences between cultivars except 'Yellow-Transparent.' The ability to retain high amounts of water in the leaves after long intervals of evaporation (24-30 hr) and before the end of the vegetation period could not be related with winterrdiness.--Copyright 1972, Biological Abstracts, W73-02164

LEAF TEMPERATURE AND TRANSPIRATION MEASUREMENTS OF TRIBULUS CISTOIDES L. IN NORTHERN COLOMBIA, Giessen Univ. (West Germany). Lehrstuhl Botank

R. Scinetter.

Ber Deut Bot Ges. 82 (3/4): 283-286. Illus. 1969.
Identifiers: *Colombia, *Leaf temperature, Measurements, Size, Temperature, *Transpiration, Tribulus cistoides D.

perature and transpiration measurements involving T. cistoides (Zygophyllaceae) were performed in the arid region near Santa Marta in northern Colombia using a thermoelement to measure lead and air temperature and the Stoker method to determine transpiration. The leaves of the plant tolerate a temperature of up to 50 deg. C.

While most plants in the arid region lose their leaves with the onset of the dry season, Tribulus keeps its leaves till the start of the next rainy season. This is made possible by its water-storing roots and by the sharp curtailment of transpiration combined with a reduction in leaf surface from 6.m2 at the onset of the dry season to 1.7 cm2 at its end. The large leaves are replaced by smaller ones in the dry season. The leaf temperature during the dry season is considerably elevated which reduces evapotranspiration. Mean leaf temperature of 52.3 deg C was recorded with an air temperature of 51.8 deg C and ground level temperature of 62.5 deg C-Copyright 1972, Biological Abstracts, Inc. W73-02195

EFFECT OF FOLIAR SPRAY AND SOIL APPLI-CATION OF CCC ON TRANSPIRATION AND DRY MATTER PRODUCTION OF SPRING

WHEAT, Lantbrukhogskolan, Uppsala (Sweden).

U. Wuensche. Z Acker Pflanzenbau. Vol 134, No 3, p 257-261. 1971. Illus.

Identifiers: Ammonium, Chloride, "Chloroethyl-trimethyl, Foliar spray, Grain, Crop production, Soils, Sprays, Spring, "Transpiration, "Wheat-M, Crop yield."

In a greenhouse experiment with spring wheat, cultivar 'Pompe,' soil application and foliar spray of CCC in both cases reduced the transpiration rate during the first half of the growth period. The influence was stronger when CCC was pplied as a foliar spray. A decrease in root growth is discussed as an explanation of why CCC reduces the transpiration rate. CCC decreased grain yield and total dry matter production. The lower grain yield was caused by a reduced number of kernels per head. The transpiration coefficient as well as the amount of water used to produce 1 g of grain was increased; the effect was stronger with foliar application of the growth regulator.—Copyright 1972, Biological Abstracts, Inc.

W73-02499

2E. Streamflow and Runoff

CREST-STAGE GAGING STATIONS IN OREGON-A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEP-**TEMBER 1972,**

Geological Survey, Portland, Oreg. For primary bibliographic entry see Field 07C. W73-02034

REPRESENTATIVE RURAL CATCHMENTS IN KENYA AND UGANDA, Road Research Lab., Crawthorne (England). For primary bibliographic entry see Field 02A. W73-02050

CIRCULATION AND HYDROLOGY UNDER THE SEASONAL ICE IN MCMURDO SOUND, THE SEASOLULE RESEARCH ANTARCTICA,
Department of Scientific and Industrial Research,
Wellington (New Zealand), Oceanographic Inst.
For primary bibliographic entry see Field 02C.

INFORMATION ON THE VELOCITY AND FLOW PATTERN OF DETROIT RIVER WATER IN WESTERN LAKE ERIE REVEALED BY AN ACCIDENTAL SALT SPILL, Toledo Water Div., Ohio. For primary bibliographic entry see Field 05B. W73-02057

EDGE WAVES WITH CURRENT SHEAR, Rhode Island Univ., Kingston. Graduate School of Oceanography.

Field 02-WATER CYCLE

Group 2E-Streamflow and Runoff

K. E. Kenyon. Journal of Geophysical Research, Vol 77, No 33, p 6599-6603, November 20, 1972. 3 fig, 11 ref. ONR Contract N00014-68-A-0215-0003.

Descriptors: "Waves (Water), "Ocean waves, "Surf, "Littoral drift, Currents (Water), Mathematical studies, Mathematical models, Roughness (Hydraulic). Identifiers: Edge waves.

A normal-mode solution was found for hydrostatic edge waves in a longshore current with constant shear. At high frequencies the frequency difference between waves of the same wave number that propagate in the two directions along the coast is proportional to the sum of the current shear and the Coriolis parameter. The low modes are more affected by the current shear than the high modes. (Knapp-USGS)
W73-02170

EFFECT OF FRICTION ON WAVE SHOALING, Reading Univ. (England). Dept. of Mathematics. J. N. Hunt, and A. H. Brampion. Journal of Geophysical Research, Vol 77, No 33, p 6558-6564, November 20, 1972. 3 fig. 5 ref.

Descriptors: *Waves (Water), *Surf, *Mathematical studies, *Fluid friction, Numerical analysis, Viscosity, Beaches, Depth.

The linearized Navier-Stokes equations may be solved directly, together with the resulting characteristic equation for progressive wave motion, for both fully contaminated and noncontaminated free soun runy contaminated and noncontaminated free surfaces. Shoaling coefficients for both cases are computed for waves obliquely and normally in-cident on beaches of various slopes, including the effect of viscous damping at both the bottom and the free surface. Friction modifies the classical shouling coefficients directly through energy dis-sipation and indirectly through modification of the dispersion relationship. Calculated wave am-plitudes, especially those calculated on the basis prittudes, especially those calculated on the basis of a fully contaminated free surface, are in better agreement with published experimental observa-tions than those predicted by the classical inviscid shoaling coefficients. Energy dissipation at a fully contaminated free surface is as large as that due to contaminated free surface is as large as that due to bottom friction even in shallow water. For oblique incidence, although wave amplitudes can be af-fected appreciably by damping, no change in the refraction pattern is found. (Knapp-USGS) W73-02173

FLOW ROUTING MODELS FOR STREAM SYSTEM STUDIES, Geological Survey, Washington, D.C. Water Resources Div.

M. E. Jennings, and V. B. Sauer. Water Resources Bulletin, Vol 8, No 5, p 948-956, October 1972. 11 fig, 15 ref.

Descriptors: *Routing, *Frequency analysis, *Streamflow forecasting, Simulation analysis, Frequency curves, Regression analysis, Reservoir operation, Water management (Applied), Unsteady flow.

Studies to determine frequency characteristics of regulated streams at points within a stream system require the use of flow routing models. This study compares several different flow routing methods using data from six river reaches. Results indicate that approximate flow routing methods yield good flow estimates when compared with observed flows. The unit response method, recently introduced, performed as well as other approximate. performed as well as other approximate methods for all reaches studied and gave better results for reaches subject to power releases. (K-napp-USGS) W73-02176

POWER SPECTRAL ANALYSIS OF WATER TEMPERATURE FLUCTUATIONS, Tennessee Technological Univ., Cookeville. For primary bibliographic entry see Field 05B. W73-02180

INDEX OF SURFACE WATER STATIONS IN TEXAS, OCTOBER 1972. Geological Survey, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02311

SERIAL-CORRELATION STRUCTURE OF DIS-CRETIZED STREAMFLOW, Geological Survey, Fort Collins, Colo. M. E. Moss. Geological Survey Open-file Report, November 1972. 83 p, 20 fig, 3 tab, 43 ref.

Descriptors: *Streamflow, *Flow characteristics, *Model studies, *Streamflow forecasting, *Mathematical studies, Equations, Hydrologic data, Stochastic processes, Correlation analysis, River basins, Meteorological data, Analytical techniques, Base flow.

Identifiers: Discretized streamflow, Serial-correlation structure.

A semi-infinite, linear-basin model that permits the estimation of the serial-correlation structure of discretized streamflows is presented. The model accounts only for that component of the correlation that is caused by baseflow. Direct runoff is treated as random noise. Annual streamflow series are approximated by first-order, mixed-autoregressive-moving average schemes. The serial-correlation coefficients that result are functions of the baseflow recession coefficient, infiltration rates, and the seasonality of the precipitation regime. Monthly or seasonal streamflow series have a more complex serial-correlation structure than the annual series because of the inherent non-stationarity of the series and because the time disthan the annual series because of the inherent non-stationarity of the series and because the time dis-tribution of precipitation is relatively more varia-ble. A comparison of the estimated first-serial-cor-relation coefficients for both the monthly and an-nual series with those observed for a streamflow record of 58 years duration is made. The com-parison indicates that the model is an acceptable tool for estimation of the serial-correlation struc-ture of discretized streamflow. (Woodard-USGS) W73.07335 W73-02323

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1970, Geological Survey, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02324

ARIZONA FLOODS OF SEPTEMBER 5 AND 6, 1970. National Weather Service, Salt Lake City, Utah. Western Region.

Natural Disaster Survey Report 70-2, July 1971. 39 p, 20 fig, 9 phot, 2 tab.

Descriptors: *Floods, *Flood damage, *Flood data, *Historic floods, *Arizona, Hydrologic data, Meteorological data, Streamflow, Rain, Peak discharge, Flood flow, Ephemeral streams, Storms, Cloudbursts, Weather forecasting.

The unprecedented flash floods in the central The unprecedented flash floods in the central mountains of Arizona on Saturday, September 5, 1970, transformed a week-end camping holiday into tragedy. The 23 lives lost make this the greatest natural disaster in the history of the State. The meteorological conditions that caused the natural disaster, the data collection and communication systems that made timely predictions and warnings possible, the dissemination of forecast statements and warnings, and the response of people to forecasts and warnings are described. The adequacy and effectiveness of the National Weather Service relative to the disaster and improvements needed to better cope with future disasters of similar scope are discussed. During the 24-hour period from 10 p.m. September 4 to 10 p.m. September 5, 11.4 inches of rain were measured in the official recording rain gage at Workman Creek, about 60 miles east-northeast of Phoenix at an elevation of 7,000 feet. This exceeded the previous 24-hour record for Arizona by more than 5 inches. All-time previous record crests were exceeded. (Woodard-USGS) W73-02325

FLOODS IN THE AGUADILLA-AGUADA AREA, NORTHWESTERN PUERTO RICO, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C. W73-02327

PROTECTION OF WATER SOURCES IN THE LOWER DNIEPER RIVER BASIN (OKHRANA VODNYKH ISTOCHNIKOV V BASSEYNE NIZHNEGO DNEPRA); For primary bibliographic entry see Field 04A. W73-02329

HYDROLOGIC INVESTIGATIONS AND FLOW COMPUTATIONS (GIDROLOGICHESKIYE ISS-LEDOVANIYA I RASCHETY STOKA). Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR). For primary bibliographic entry see Field 04A. W73-02330

RUNOFF COEFFICIENTS FOR AREAS BETWEEN ISOCHRONES (O KOEFFITSIYEN-TAKH YESTESTVENNOGO ZAREGU-LIROVANIYA STOKA NA MEZHIZOKHRON-NYKH UCHASTKAKH),
Ukrainskii Nauchno-Issledovatelskii Gidro-Msteorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W73-02331

FORM OF THE RELATION BETWEEN MELT-WATER LOSSES AND SOME HYDROLOGIC CHARACTERISTICS (O VOZMOZHNOY OT NEKOTORYKH OD NEKOTORYKH OBUSLOVLIVAYUSHCHIKH FAKTOROV), Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR). V. A. Romanenko. In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovatel skiy Gidrometeorologichekiy Institut Trudy, No 93, p 71-79, Moscow, 1970. 3 fig, 2 tab, 9 ref. FORME ZAVISIMOSTI POTER' TALYKH VOD

Descriptors: "Hydrology, "Hydrologic aspects, "Melt water, Water balance, Water storage, Moisture deficit, Soil water, Freezing, Melting, Snowmelt, Meteorology, Rainfall-runoff relationships, Runoff forecasting, Floods, Rivers, Watersheds (Basins), Drainage area, Equations. Identifiers: "USSR, "Ukraine, "Dnieper River.

The relation of melt-water losses to water storage in a basin, depth of soil freezing, and moisture deficit in the top meter layer of soil before snowmelt was investigated in the relatively small drainage basins of the Sula, Pael, Vorskla, Orel', and Volch'ya Rivers on the left bank of the Dnieper in the Ukraine. The drainage areas of the rivers examined range in size from 9,100 aq km to 22,400 sq km. The computation procedures employed are sufficiently accurate and can be used to forecast melt-water runoff in the spring. (See also W73-02330) (Josefson-USGS)

STOR RIVE PAVO DAVI Ukrai Meteo For pi W73-0

INVE LEDO DOBE PATA Ukrai Metec

ANNUTHE GODO TRA) Ukrai Meter For p NOT OF TION Alasi G. L. Wate 1360,

> Desc analy studi flow An i procesupe finite trodi form stant

> > prob W73 A R Ariz Wat For W73

prov

AN -GE PRE Con H. C 1 ap Des

flow tra, An was the sure air m/s STORM RUNOFF COEFFICIENTS FOR RIVERS OF THE UKRAINE AND MOLDAVIA (KOEFFTSIYENTY STOKA DOZHDEVYKH PAVODKOV NA REKAKH UKRAINY I MOLDAVII),
UKrainskii Nauchno-Isaladana. Ukrainskii Nauchno-Issledovatelskii Gi Meteorologicheskii Institut, Kiev (USSR). For primary bibliographic entry see Field 04A.

INVESTIGATION OF THE RATES AND TRAVELTIME OF STORM RUNOFF IN THE CARPATHIANS (K VOPROSU OB ISSLEDOVANII SKOROSTEY I VREMENI DOBEGANIYA LIVNEVYKH VOD V KARPATAKH),
Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicka kii issledovatelskii issledo Ukrainskii Nauchno-Issledovatelskii Gi Meteorologicheskii Institut, Kiev (USSR). For primary bibliographic entry see Field 04A. W73-02334

ANNUAL STREAMFLOW FLUCTUATIONS IN THE DNIESTER RIVER BASIN (KOLEBANIYA GODOVOGO STOKA REK BASSEYNA DNES-

TRA),
Ukrainskii Nauchno-Issledovatelskii Gi
Meteorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 04A.
W73-02335 Gidro-

NOTE ON THE FINITE ELEMENT SOLUTION OF THE DIFFUSION-CONVECTION EQUA-TION, Alaska Univ., College. Inst. of Water Resources.

Alaska Oliv, College G. L. Guymon. Water Resources Research, Vol 8, No 5, p 1357-1360, October 1972. 1 fig, 5 ref.

Descriptors: *Finite element analysis, *Numerical analysis, *Diffusion, *Convection, Mathematical studies, Turbulence, Currents (Water), Unsteady flow, Non-uniform flow.

An improved formulation of the finite element procedure, based on a variational principle, yields superior results to a previous formulation of the finite element method. Numerical dispersion, infinite element method. Numerical dispersion, in-troduced into the previous formulation by a trans-formation procedure that is unneccessary, is sub-stantially reduced by the new procedure. The im-proved formulation of the problem yields a stable solution for a hypothetical stream mass transport problem. (Knapp-USGS) W73-02338

A RANDOM-WALK SIMULATION MODEL OF A RANDOM-WALK SIMULATION MODEL OF ALLUVIAL FAN DEPOSITION, Arizona Univ., Tucson. Dept. of Hydrology and Water Resources. For primary bibliographic entry see Field 02J. W73-02342

AN EXPERIMENTAL STUDY OF WIND-GENERATED WAVES WITH AND WITHOUT PRESSURE GRADIENT, Connecticut Univ., Storts.
H. C. Liang.
Ph.D. Thesis, 1972. 119 p, 6 tab, 8 p, 66 fig, 43 ref, 1 append. OWRR A-021-CONN (3) 14-31-0001-3507.

Descriptors: *Waves (Water), *Winds, Turbulent flow, Wind velocity, Boundary layers. Identifiers: *Wind-generated waves, Energy spec-tra, Dominant wave, Boundary layer charac-

An experimental study of wind-generated waves was conducted in a 35 ft. wind-wave channel under the laboratory conditions with and without pressure gradient. The turbulent flow characteristics of air were recorded for wind speeds of 6, 8 and 12 m/s over an undisturbed water depth of 19 cm and

over a smooth solid surface. The statistical properties of wind-waves such as the deviation of mean water surface from the undisturbed level, standard deviations of local wave height, energy spectra of wind-waves and the dominant wave were derived. The result demonstrated that air flow over water dynamically corresponds to turbulent boundary layer flow over a rough surface, i.e., the velocity distribution near the surface follows the 'law of the wall'. The existence of a dominant wave in a narrow frequency band and the f-5 law for the energy spectra of equilibrium waves was also con-firmed. Direct comparisons of the boundary layer characteristics over a smooth solid surface and over waves, and of the wind-waves with and without pressure gradients were made to determine the effect on the growth characteristics of wind waves.
W73-02346

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEX METROPOLITAN AREA, 1970, Geological Survey, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02482

MELTWATER GAGING PROGRAM PROJECT NO 1, APPROACH ROADS, TUTO AREA, GREENLAND. Army Engineer Waterways Experiment Station,

Vicksburg, Miss.
For primary bibliographic entry see Field 02C. W73-02486

SUMMARY OF PEAK STAGES AND DISCHARGES IN NEW YORK FOR THE FLOOD OF JUNE 1972,

Geological Survey, Albany, N.Y. K. I. Darmer.

Geological Survey Open-file Report, 1972. 15 p, 4

Descriptors: *Floods, *Streamflow, discharge, *Stream gages, *New York, Data coldischarge, Stream gages, 1987 and 1987

Intense rainfall associated with Tropical Storm Agnes in late June 1972 resulted in the greatest flood disaster in the history of New York State. Flooding began in Westchester County on June 19 and was followed by widespread flooding in the Southern Tier and the Finger Lakes region on June 23. Peak stage and discharge data are tabulated for 178 sites on New York streams. Peak discharges at many long-term gaging stations far exceeded the maximum flows previously recorded. At the gag-ing station on Chemung River at Chemung, with 65 years of record, the peak stage was 31.62 feet (discharge 189,000 cfs) as compared with the previous maximum of 23.97 feet (discharge 132,000 cfs). The distinctive aspects of the flood were the devastation of extremely large areas and the occurrence of the highest flows known on the large streams. Stages and discharges for the June 1972 flood are compared with previous floods where such data are available. (Woodard-USGS) W73-02497

HISTORY OF WATER LEVEL GAUGES, LAKE ERIE AND THE NIAGARA RIVER.
For primary bibliographic entry see Field 07C.

2F. Groundwater

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS,

GROUNDWATER IN CRYSTALLINE ROCKS, Georgia Univ., Athens. Dept. of Geology. J. Hatten, III. Available from the National Technical Informa-tion Service as PB-213 184, \$3.00 in paper copy, \$0.95 in microfiche. Completion Report, October, 1972. 21p, 7 fig, 2 ref. OWRR B-010-GA (1), 14-01-0001-1488.

Descriptors: *Hardpan, Subsoil, Groundwater recharge, *Saprolites, Granites, Georgia, *Infiltra-tion, *Metamorphic rocks, Permeability, *Crystal-line rocks, Rock properties. Identifiers: *Rock weathering, *Georgia Pied-

Geochemical, mineralogical, and textural studies of weathering mantles of crystalline rocks of the Georgia Piedmont show that a low-permeability horizon, which develops during the weathering of some rock types and which impedes infiltration of water from the surface, associates with the accumulation of kaolinite and oxides of iron, aluminum, and silicon. Three types of hardpan were found, but only one is extensive in its impedance of water infiltration. This is a dense lawer, often minum, and sincol. Inter types of naropan were found, but only one is extensive in its impedance of water infiltration. This is a dense layer, often several feet thick and composed of accumulations of hematite, kaolinite, and probably silica, which form in the weathering mantle of granitic and gneissic rocks. It may be possible to disrupt this low-permeability layer by application of organic reducing agents, thus increasing water infiltration for recharge of underlying aquifers. The geologic terrane is a very important factor in the development of the low-permeability horizons, which develop on rocks of fairly uniform structure and texture: plutonic granites and granite gneisses. Low-permeability zones do not develop on dense fine-grained rocks or metamorphic rocks with inclined foliation. Better well sites can be selected by using knowledge of the areal geology so as to avoid areas with likelihood of hardpan development and thus low water infiltration. (James-Georgia Tech) gia Tech) W73-01955

RECHARGE TO GROUND WATER FROM THE WEST NISHNABOTNA RIVER, Iowa State Univ., Ames. Dept. of Earth Sciences. For primary bibliographic entry see Field 04B. W73-0203

WATER TABLE FLUCTUATIONS IN THE MEERUT DISTRICT, UTTAR PRADESH, IN-DIA, Banaras Hindu Univ., Varanasi, (India). Dept. of Geography.
For primary bibliographic entry see Field 04B.
W73-02044

GROUND-WATER CONDITIONS IN ANDER-SON, CHEROKEE, FREESTONE, AND HEN-DERSON COUNTIES, TEXAS. Guyton (William F.) and Associates, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02049

GEOCHEMISTRY OF GROUND WATERS FROM BURG EL-ARAB AREA, EGYPT, Frankfurt Univ. (West Germany). Institute of Petrology, Geochemistry and Stratification. For primary bibliographic entry see Field 02K. W73-02053

BIBLIOGRAPHY ON THE HYDROGEOLOGY OF SIBERIA AND THE SOVIET FAR EAST FOR THE PERIOD 1918-1965 (GIDROGEOLOGIYA

Field 02-WATER CYCLE

Group 2F-Groundwater

SIBIRI I DAL'NEGO VOSTOKA. BIBLIOGRAFICHESKIY UKAZATEL'. 1918-

-1965), Institut Zemnoi Kory, Irkutsk (USSR). V. L. Kenzina, I. S. Lomonosov, G. V. Dmitriyeva, and L. M. Ol'khovik. Akademiya Nauk SSSR Sibirskoye Otdeleniye, Institut Zemnoy Kory, Irkutsk, 1967. 199 p.

Descriptors: *Bibliographies, *Publications, *Data collections, *Hydrogeology, *Groundwater, Geographical regions, Investigations, Maps. Identifiers: *USSR, *Siberia, *Soviet Far East.

This bibliography is a compilation of Russian-language literature dealing with the hydrogeology of Siberia and the Soviet Far East. This listing contains 2,292 references to books, monographs, articles, authors' abstracts, etc., published from 1918 through 1965. Besides a general listing, the references are arranged under 3 geographical headings (Western Siberia, Eastern Siberia, and Soviet Far East), subdivided into territories, oblasts, and autonomous republics. An author index and a subject index are appended. (Josefson-USGS)

KARST IN CARBONATE ROCKS (KARST V KARBONATNYKH PORODAKH).

Moskovskoye Obshchestvo Ispytateley Prirody Trudy, Vol 47, Otdel Geologo-Geograficheskiy, Sektsiya Geografii: Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, Moscow, Chikishev, A. G., editor, 1972. 184 p.

Descriptors: *Karst, *Karst hydrology, *Carbonate rocks, Hydrogeology, Structural geology, Orography, Topography, Sinks, Caves, Limestones, Dolomite, Organic acids, Groundwater, Artesian aquifers, Subsurface drainage, Erosion, Lakes, Cycles, Investigations, Conferences.

Identifiers: *USSR, *Carbonate karst, *Karst studies, *Karst areas, *Karst topography, Karst rocks, Karst lakes, Platforms (Geologic), Outliers, Speleology.

This collection of 19 papers is devoted to new investigations of carbonate karst in different parts of the USSR and to conditions essential to its development. Individual topics include: (1) groundwater in carbonate karst of artesian basins and fold regions of the USSR; (2) role of organic acids in carbonate-karst formation; (3) hydrodynamic features of karst development on platforms and folded mountain ranges; (4) lakes of carbonate karst areas; (5) origin and development of limestone caverns; (6) evolution of a karst geomorphic cycle on the Siberian Platforn; (7) limestone outliers of the Pamirs and Alay Mountains as relict forms of tropical karst; (8) caves of the Bashkir ASSR; and (9) chalk karst in the Central Chernozem Area. (Josefson-USGS)

A DICTIONARY OF HYDROGEOLOGY AND ENGINEERING GEOLOGY (SLOVAR' PO GIDROGEOLOGII I INZHENERNOY GEOLOGII), I INZHENERNOY GEOLOGII, Contific Research Inst. of

All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR). For primary bibliographic entry see Field 10A.

SALT POLLUTION OF GROUND WATER, Missouri Water Resources Research Center, Rolla. For primary bibliographic entry see Field 05B.

W73-02064

SALT POLLUTION OF GROUND WATER,

CHEMICAL ANALYSES OF WATER FROM OBSERVATION WELLS IN THE EDWARDS AND ASSOCIATED LIMESTONES, SAN AN-TONIO AREA, TEXAS, 1967. Geological Survey, San Antonio, Tex. For primary bibliographic entry see Field 02K. W73-02307

RECORDS OF PRECIPITATION, AQUIFER HEAD, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS,-1968.
Geological Survey, San Antonio, Tex.

Edwards Underground Water District Bulletin 21, June 1969. 9 p, 4 tab, 10 ref.

Descriptors: *Hydrologic data, *Precipitation (Atmospheric), *Groundwater recharge, *Water levels, *Texas, Aquifers, Groundwater movement, Aquifer characteristics, Limestones, Basic data collections, Water level fluctuations. Identifiers: *San Antonio area (Tex).

The Edwards and associated limestones, the principal aquifer in the San Antonio area, has been the subject of numerous geologic and hydrologic reports. Records of precipitation, water levels, and estimates of recharge to the aquifer during 1968 are summarized. The annual precipitation at selected stations throughout the San Antonio area for 1968 and the annual average for each of these stations are tabulated. Rainfall was excessive during the first few months of 1968, and the yearly totals are generally above average. For example, at San Marcos the long-term average (68 years) is 32.48 inches while the 1968 average was 37.13 inches. (Woodard-USGS)

A SHALLOW ARTESIAN AQUIFER IN THE TERTIARY DEPOSITS OF SOUTHERN CAPE YORK PENINSULA.

YORK PENINSULA, Geological Survey of Queensland, Brisbane (Australia). For primary bibliographic entry see Field 04B. W73-02309

NOTE ON THE FINITE ELEMENT SOLUTION OF THE DIFFUSION-CONVECTION EQUA-TION, Alaska Univ., College. Inst. of Water Resources.

Alaska Univ., College. Inst. of Water Resources. For primary bibliographic entry see Field 02E. W73-02338

FINITE ELEMENT ANALYSIS OF FLOW TOWARD ARTESIAN WELL, Kentucky Univ., Lexington. Dept. of Civil Engineering.

Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY11, p 2055-2059, November 1972. 2 fig, 6 ref. OWRR A-042-KY (1) 11.14-31-0001-3517.

Descriptors: *Groundwater movement, *Finite element analysis, *Numerical analysis, *Artesian aquifers, *Drawdown, Water yield, Discharge (Water), Artesian wells, Unsteady flow, Artesian heads.

A finite element method is given for analyzing unsteady flow toward a partially penetrating artesian well. The method can be applied to cases involving either an infinitesimal well or a finite well with either uniform or nonuniform discharge along the well bore. In view of the fact that the drawdown around a partially penetrating well varies with depth and the discharge from the well at any given depth depends on the corresponding drawdown, the assumption of nonuniform discharge is more realistic from a practical viewpoint. The assumpression of the corresponding that the same processes are the correspondent of the corresponding drawdown, the assumption of nonuniform discharge is more realistic from a practical viewpoint. The assump-

8

tion of uniform discharge along the well bore may involve considerable error, unless the point in question is at a large distance from the well. (Knapp-USGS) W73-02340

COLLECTED REPRINTS, VOLUME II 1969-1970. Hawaii Univ., Honolulu. Water Resources Research Center. For primary bibliographic entry see Field 04B. W73-02347.

GEOPHYSICAL, GEOHYDROLOGICAL, AND GEOCHEMICAL RECONNAISSANCE OF THE LUKE SALT BODY, CENTRAL ARIZONA, Geological Survey, Washington, D.C. G. P. Eaton, D. L. Peterson, and H. H. Schumann. Available from GPO, Washington, D.C. 20402, Price: 40 cents (paper cover). Geological Survey Professional Paper 753, 1972. 28 p, 15 fig, 1 tab, 45 ref

Descriptors: *Salts, *Geology, *Hydrogeology, *Geochemistry, *Arizona, Exploration, Borehole geophysics, Saltation, Water wells, Withdrawals, Water quality, Salinity, Bromine, Chemical analysis, Groundwater movement, Transmissivity, Sediments, Data collections, Geologic time. Identifiers: *Luke Salt Body (Ariz), Underground salt deposits.

A major salt body lies hidden beneath the floor of the western Salt River Valley, 17 miles west-morthwest of Phoenix, Ariz. The base of the body is at a depth of at least 6,900 feet. The upper 3,600 feet of the salt has been penetrated by drilling. The body is overlain locally by an anhydrite layer 90 feet thick. Geohydrologic data indicate that the upper part of the salt has a pronounced local effect on the salinity of the groundwater and an indirect effect on the transmissivity of the alluvial fill. Grain-size data suggest that the area above the body stood relatively higher than its surroundings throughout the later part of late Cenozoic time. A local earth-fracture system which appears to owe its location, at least in part, to the existence of the body indicates that adjustments are still occurring, probably in direct response to large groundwater withdrawals. Bromine analyses of drill cuttings from the deep test average 2 ppm, much below the threshold value of 30 ppm characteristic of marine halite. It is possible that the salt accumulated in a longstanding saline lake sometime during the middle Tertiary, or possibly even earlier. (Woodard-USGS)

HYDROCHEMICAL STUDY OF THE NATIONAL REACTOR TESTING STATION, Ballogical Survey, Menlo Park, Calif. For primary bibliographic entry see Field 05B.

HYDROGEOLOGY OF THE FORTY MILE CREEK DRAINAGE BASIN ON THE SOUTH SHORE OF LAKE ONTARIO, Ontario Water Resources Commission, Toronto. Div. of Water Resources. For primary bibliographic entry see Field 02H. W73-02503

2G. Water in Soils

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS, Georgia Univ., Athens. Dept. of Geology. For primary bibliographic entry see Field 02F. W73-01952

CHEMI FROM ERIE, Ohio S Center. For pris W73-01

SOILS SYSTE Maine I For pris

> SOIL 1 NO. 2 PROTS Mosco For pri W73-0

> > IN T

THE

(POD: FORM REZH Akade stitut For p: W73-4

> SOII CAT TY, New of A For W73

of Ci

EFF STE OF N. 1 Bur Khi Ide: *Ph

per 1 p per 31coc tur ob Bi

wit

CI CI GI V J. V es Id CHEMICAL AND SEDIMENT MOVEMENT FROM AGRICULTURAL LAND INTO LAKE ERIE,

Ohio State Univ., Columbus. Water Resources Center.
For primary bibliographic entry see Field 05B.
W73-01957

EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUND WATER SYSTEMS, Maine Univ., Orono. Dept. of Soil Sciences. For primary bibliographic entry see Field 05B. W73-01960

SOIL EROSION AND CHANNEL PROCESSES.
NO. 2. (EROZIYA POCHV I RUSLOVYYE
PROTSESSY. VYPUSK 2.).
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02J.

SUBSURFACE WATER AS A MAJOR FACTOR IN THE FORMATION OF LANDSLIDES ON THE LEFT BANK OF THE CHIRCHIK RIVER (PODZEMNYYE VODY-OSNOVNOY FAKTOR FORMIROVANIYA OPOLZNEY LEVOBE-REZH'YA CHIRCHIKA), Akademiya Nauk Uzbekskoi SSR, Tashkent. In-

stitut Seismologii. For primary bibliographic entry see Field 02J. W73-02066

CONTROL OF NITRATE CONTAMINATION OF GROUND WATER ASSOCIATED WITH LAND DISPOSAL OF MUNICIPAL SEWAGE, Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-02111

ASSOCIATIONS AND LAND CLASSIFI-CATION FOR IRRIGATION, SOCORRO COUN-

TY, New Mexico State Univ., University Park. Dept. of Agronomy. For primary bibliographic entry see Field 03F. W73-02117

EFFECT OF POLYMER FERTILIZERS ON THE STRUCTURAL-MECHANICAL PROPERTIES OF SOIL (IN RUSSIAN), N. N. Kruglitskii, G. A. Kudel'Skaya, N. K.

Burykina, and V. P. Batyuk. Khim Prom Ukr. Vol 1, No 49, p 20-21. 1970. Identifiers: Coagulation, Dispersity, *Fertilizers, *Phosphates, *Polymers, *Soil properties.

The elastic-plastic-viscous properties of soils without and with addition of fertilizers (superphosphate, KCl and croto.idenediurea, an MK-l preparation) were studied. The application of superphosphate to soil with a low moisture content 31-32% reduced dispersity and produced stronger coagulation structures, with the more elastic structural units predominating. Identical results were obtained with KCl and MK-1.—Copyright 1972, Biological Abstracts, Inc.

CHANGES OF SOIL MOISTURE UNDER LU-CERNE AND MAIZE STANDS GROWN FOR GREEN MASS (IN CZECH), Vyskumny Ustav Rastlinnej Vyroby, Piestany. J. Kosik.

Nosas. Ved Pr Vysk Ustavu Rastlinnej Vyroby Pi-estanoch. 8. p 119-132. 1970. English summary. Identifiers: Barley-M, Green mass, *Lucerne-D, *Maize-M, *Soil moisture, Tillage.

The soil moisture content in the depth of 5-70 cm under maize grown for silage was significantly higher than that under lucerne. In the first utility yr the soil 5-20 cm under lucerne was dried out. Barthe soil 5-20 cm under lucerne was dried out. Bar-ley with the underseed of lucerne drained more soil moisture than maize. After the harvest of bar-ley the soil moisture relations were just the reverse. The effect of the 3 applied tillage techniques was not uniform. The effect of the til-lage technique moisture was greater in the subsoil than in the topsoil layer.—Copyright 1972, Biologi-cal Abstracts, Inc. W73-07142

CONTRIBUTION TO THE STUDY OF NITROGEN LEACHING IN A SANDY SOIL ('-

NITRUGEN LEACHING IN A SANDY SOIL (*-DIOR') IN SENEGAL, Centre National de Recherches Agronomiques de Bambey (Senegal). For primary bibliographic entry see Field 05G. W73-02161

EROSION AND DEFLATION OF SOILS (IN RUSSIAN),

For primary bibliographic entry see Field 02J. W73-02163

SOIL AMELIORATION CONDITIONS IN THE AKDALA IRRIGATED MASSIF (ON THE EX-ING SOVKHOZ) (IN RUSSIAN), For primary bibliographic entry see Field 03F. W73-02184 AMPLE OF THE BAKHBAKHTA RICE GROW-

EFFECT OF TEMPERATURE ON PRESSURE

EFFECT OF TEMPERATURE ON PRESSURE HEAD-WATER CONTENT RELATIONSHIP AND CONDUCTIVITY OF TWO SOILS, Mississippi Agricultural and Forestry Experiment Station, State College.

M. Haridasan, and R. D. Jensen.
Soil Science Society of America Proceedings, Vol. 36, No. 5, p. 703-708, September-October 1972. 6 fig. 2 tab, 14 ref. OWRR B-002-MISS (3) 14-01-0001-1024.

Descriptors: *Hydraulic conductivity, *Water temperature, *Pressure head, *Moisture content, Soil moisture, Soil water, Permeameters, Unsaturated flow, Soil water movement, Viscosity, Unsteady flow.

A series of experiments was conducted in the A series of experiments was conducted in the laboratory to study the effect of temperature on pressure head-water content relationship and on hydraulic conductivity as a function of water con-tent and pressure head in two silt loam soils. Hydraulic conductivity was determined as a function of water content and pressure head at con-stant temperatures of 15, 25, and 35 deg C by steady state and pressure plate outflow methods steady state and pressure plate outlow memous. The temperature dependence of pressure head-water content relationship during pressure plate outflow could not be explained on the basis of changes in surface tension of air-water interfaces alone. Pressure head-water content relationship under steady state flow conditions was different from that under transient flow conditions during pressure plate outflow. Desorption curves obtained at the three temperatures under steady state flow conditions did not reflect any temperature effects. Results of the steady state experiments were too variable to reflect any temperature depen-dence of hydraulic conductivity either as a function of water content or as a function of pressure head of soil water. Hydraulic conductivity as a function of soil water content was more tempera ture dependent than as a function of pressure head of soil water. The increase in hydraulic conductivi-ty at a given water content due to temperature rise is almost entirely accounted for by the decrease in viscosity of water. (Knapp-USGS)

FROST-HEAVING PRESSURES. Cold Regions Research and Engineering Lab., Hanover, N.H. For primary bibliographic entry see Field 02C. W73-0237

ALGAL NITROGEN FIXATION IN TEM-PERATE REGIONS, Uppsala Univ. (Sweden). Inst. of Physiological Botany. For primary bibliographic entry see Field 05C. W73-02471

THE RESPONSE OF ROOT AND SHOOT GROWTH TO DECREASES IN SOIL WATER POTENTIAL, POTENTIAL, Montana Univ., Missoula. Dept. of Resources Conservation For primary bibliographic entry see Field 02I. W73-02558

2H. Lakes

TRANSITION METALS OF IMPOUNDED WATERS, Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 05B.
W73-01953

A STUDY OF THE EFFECTS OF ISLAND DEVELOPMENT ON LAKE WATER QUALITY, Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 05C.
W73-01954

CHEMICAL AND SEDIMENT MOVEMENT FROM AGRICULTURAL LAND INTO LAKE ERIE. Ohio State Univ., Columbus. Water Resources For primary bibliographic entry see Field 05B. W73-01957

THE CONTRIBUTION OF LEPTODORA AND OTHER ZOOPLANKTON TO THE DIET OF VARIOUS FISH, Platenty huniv., Pa. Pymatuning Lab. of Ecolopitics burgh Univ., Pa. Pymatuning Lab.

gy. For primary bibliographic entry see Field 05C. W73-02031

THERMAL EFFECTS OF POWER PLANTS ON

LAKES, Cornell Univ., Ithaca, N.Y. Collea Only, Indiaca, N.T. F. K. Moore, and Y. Jahuria. Transactions, American Society of Mechanical Engineers, Series C.-Journal of Heat Transfer, Vol 94, No 2, p 163-168, May 1972. 7 fig. 1 tab, 8

Descriptors: *Thermal stratification, *Turnovers, Descriptors: "Inermal stratuncation," Jurnovers, *Lakes, "Cooling water, "Nuclear powerplants, *Heat transfer, Water quality, Epilimnion, New York, Thermocline, Isotherms, Model studies, Thermal energy, Dissolved oxygen, Diffusion, Hypolimnion, Mixing, Mathematical models. Identifiers: "Perturbation, Cayuga Lake (N.Y.), Richardson number.

The natural thermal cycle of a stratified water body used for powerplant cooling will be disturbed both by heat addition and the mixing effect of withdrawal and return. A perturbation analysis for these effects is modeled assuming a Richardson number as a constant at the base of a stratified layer. Constant heat flux from the layer is based on assumed wind-driven return current profiles. on assumed wind-driven return current profiles.

This heat flux and the diffusion coefficient at the

Group 2H-Lakes

thermocline are the critical parameters of the simple onemdimensional line-segment model, chosen to imitate the natural cycle of Cayuga Lake. The model is then perturbed in terms of both heat flux and diffusion to simulate powerplant impact on the lake. Both transient and final cycle changes of summer and winter temperatures and stratification and overturn are calculated. Heat and diffusion efand overturn are calculated, reat and diffusion effects are shown to be comparable; the latter may be dominant if the discharge is diluted to meet a thermal standard. Different strategies are suggested for using lake water to cool the powerplant. (USBR) W73_02068

OVERGROWING OF THE DAM RESERVOIR AT GOCZALKOWICE IN THE YEARS 1967--1969,

Pszczyna, Pol. Polish Academy of Sciences, Pszczyna. Hydrobiological Station. T. Kuflikowski.

Acta Hydrobiol. Vol 13, No 3, p 313-321. 1971. Il-

Identifiers: Dams, *Goczalkowice (USSR), Plants, *Poland, Reservoirs, *Vascular plants.

The development of vascular plants has been observed since 1956. Some stabilization is noted. Changes are chiefly due to shifts in water level.—Copyright 1972, Biological Abstracts, Inc. W73-02088

THE LITTORAL VEGETATION AT LAKE MJORN IN WESTERN VASTERGOTLAND, (IN

SWEDISH), Goteborg Univ. (Sweden). Inst. of Systematic Botany.

L. Andersson

Sven Bot Tidskr. Vol 65, No 4, p 323-350. 1971. Il-

Sven Bot Huser. Vot 65, No 4, p 323-350. 1371. 1-lus. English summary. Identifiers: *Lake Mjorn, *Littoral vegatation, Alnus-D, Calamagrostis-M, Carex-M-Supp, Elatine-D, Equisetum-Fluviatilis-P, Lakes, Ranunculus-D, *Sweden, Vastergotland, Vegeta-tion, Veronica-Longifolia-D.

The plant communities of the littoral zone of Lake Mjorn in western Vastergotland, Sweden, were studied from a sociological point of view. The lichen and algae communities of the rocky shores were not investigated. Nine communities were given a more detailed treatment. From the geolitgiven a more detailed treatment. From the geome-toral zone the Cariceto elongatae-Alnetum medioeuropaeum, the Calamagrostidetum neglec-tae and the Veronica longifolia association are described. The 2 former are found on fine sedi-ments of fine sand, the latter on stony shores. From the hydrolittoral zone the Caricetum acutae, the Caricetum elatae and the Glycerietum maximae, all of which are found on fine sediment bottoms or fine sand, are described. Mainly confined toms or tine sand, are described. Mainly confined to the upper sublittoral zone are the Equisetum fluviatilis, the Elatinetum and the Ranunculetum reptantis with its 2 subassociations subularietosum and typicum. Only the last-named subassociation is found on stony shores, all the other communities on sand or fine sediments.—Conyright 1972, Biological Abstracts, Inc. W73-02104

WATER QUALITY OF HYRUM LAKE AND ITS RELATIONSHIP TO ALGAL BLOOMS, Utah Water Research Lab., Logan. For primary bibliographic entry see Field 05C.

HYPOLIMNION AERATION, Texas Univ., Austin. Dept. of Civil Engineering. For primary bibliographic entry see Field 05F. ARTIFICIAL DESTRATIFICATION IN RESER-

VOIRS.
American Water Works Association, New York.
Quality Control in Reservoirs Committee.
For primary bibliographic entry see Field 05G.
W73-02138

GREAT LAKES BASIN COMMISSION CHAL-LENGES FOR THE FUTURE, AN INTERIM RE-PORT ON THE GREAT LAKES BASIN FRAMEWORK STUDY. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06B. W73-02291

AN EXPERIMENTAL STUDY OF WIND-GENERATED WAVES WITH AND WITHOUT PRESSURE GRADIENT, Connecticut Univ., Storrs.
For primary bibliographic entry see Field 02E.
W73-02346

THE IMPACT OF REDUCED LIGHT PENETRA-TION ON A EUTROPHIC FARM POND, Nebraska Univ., Lincoln. Dept. of Zoology. For primary bibliographic entry see Field 05C. W73-02349

ANNOTATED BIBLIOGRAPHY OF LAKE ON-TARIO LIMNOLOGICAL AND RELATED STU-DIES. 1. - CHEMISTRY, State Univ., Coll., Buffalo, N.Y. Great Lakes Lab. For primary bibliographic entry see Field 05C. W73-02443

OXIDATION-REDUCTION POTENTIALS, OX-YGEN CONCENTRATION AND OXYGEN UP-TAKE OF PROFUNDAL SEDIMENTS IN A EUTROPHIC LAKE, Copenhagne Univ. (Denmark). Freshwater Biolog-ical Lab.

For primary bibliographic entry see Field 05C. W73-02451

INVESTIGATIONS ON NUTRIENT FACTORS LIMITING PHYTOPLANKTON PRODUCTIVI-TY IN TWO CENTRAL VIRGINIA PONDS, Virginia Commonwealth Univ., Richmond. For primary bibliographic entry see Field 05C. W73-02452

EFFECTS OF AN ORGANOPHOSPHORUS IN-SECTICIDE ON THE PHYTOPLANKTON, ZOOPLANKTON, AND INSECT POPULATIONS OF FRESH-WATER PONDS, California Univ., Berkeley. Dept. of Entomology and Parasitology. For primary bibliographic entry see Field 05C. W73-02453

CHARACTERIZATION OF PHENOLS IN AREAS OF WATER 'BLOOMING' IN OPEN BODIES OF WATER, Kiev Research Inst. of General Communal Hy-giene (USSR). For primary bibliographic entry see Field 05C. W73-02460

NITROGEN FIXATION IN LAKES, London Univ. (England); and Westfield Coll., London (England). Dept. of Botany. For primary bibliographic entry see Field 05C. W73-02472

HISTORY OF WATER LEVEL GAUGES, LAKE ERIE AND THE NIAGARA RIVER. For primary bibliographic entry see Field 07C. For primary W73-02493

PROCEEDINGS, FOURTEENTH CONFERENCE ON GREAT LAKES RESEARCH.

Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Ontario, Canada, April 19-21, 1971: International Associa-tion for Great Lakes Research, 1971: 834 p.

Descriptors: "Conferences, "Operations research, "Great lakes, "Hydrology, "Limnology, Publications, Geology, Biology, Water circulation, Currents (Water), Model studies, Meteorology, Water pollution sources, Environmental effects, Shores, Social aspects, Analytical techniques, Instrumentation, Data collections.

The Fourteenth Conference on Great Lakes Research was co-hosted by Canada Centre for In-land Waters at Burlington and the Great Lakes In-stitute at the University of Toronto. There were 132 stitte at the University of Toronto. There were 132 papers presented in three concurrent sessions plus three symposia, and 572 people attended. The papers are divided into 6 main categories: Biology, Chemical Limnology, Geology, Meteorology and Chydrology, Physical Limnology, and General. Also included are minutes of the meeting; treasurer's report; by laws, International Association for Great Lakes Research; and membership list, International Association for Great Lakes Research (Woodard-USGS) W73-02498

THE EFFECT OF ECOLOGICAL CONDITIONS ON THE PARASITE FAUNA OF PERCH PERCA FLUVIATILIS L. IN LAKE DARGIN, Wyzsza Szkola Rolnicza, Szczecin (Poland). For primary bibliographic entry see Field 05C. W73-02500

SEISMIC PROFILING AND GEOLOGY OF THE TORONTO WATERFRONT AREA OF LAKE

TORONTO WATERFRONT AREA OF LAKE ONTARIO,
Geological Survey of Canada, Ottawa (Ontario).
C. F. M. Lewis, and P. G. Sly.
In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Ontario, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 303-354, 1971. 16 fig, 5 tab, 53 ref.

Descriptors: "Seismic studies, "Geology, *Lake Ontario, "Canada, "Shores, Data collections, Methodology, Instrumentation, Profiles, Stratifi-cation, Surveys, Sediments, Geomorphology, cation, Surve,
Lake morphology.
*Seismic Identifiers: *Seismic profiling, *Analorecordings, *Toronto (Canada), Waterfront area. *Analog

Ninety kilometers of continuous high-resolution seimic reflection profiling were run in the Toronto area of Lake Ontario. Broad-band analog recordings were made using a single boomer source and a multi-element eel. A magnetic tape recorder was interfaced with the analog recorder so that selected record portions could be reprocessed. Between Humber Bay and Scarborough the lake bottom shelves gently offshore into depths of 9-23 m. It is veneered with sand and gravel, and glacial sediments locally outcrop. Lakeward the shelf is terminated by a bold scarp, which drops abruptly to depths of plus or minus 60 m along its 15-km length. Strata appear to be truncated in the face and some slumping exists. Lakeward, the bottom continues to slope gently into the mid-lake area. Thin silts and sandy silts overlie glaciolacustrine muds in the deeper areas. A thin mud deposit overlies glacial materials in Humber Bay. Bedrock in the Toronto area, 6-30 m below lake level, slopes gently offshore at slightly more than the regional dip of less than 0.5 deg. Two major drift-filled valleys dissect the bedrock surface. One extends southeastward at a depth of about 30 m (at the lake shore) beneath the Humber River; the other passes southward under east Toronto and joins with the 'proto-Humber' about 23 m below lake bottom, some 4 km offshore. A Ninety kilometers of continuous high-resolution

minor in Don Val W73-025

REG TION O Michiga Researc N. W. O In: Pro Lakes F April 19 Great L ref.

Descrip Descrip
*Lake
Michiga
Analyti
dies, Fi
Wiscon Identifi

Associa

trends

crops i of Lak vey of

east-we

corresp netic a related netic metase extend westw tersect west a and m drilling guer gi gravity the ex lated The i across correl this ar

CREE SHOP Div. o R. C. In: P Laker April Great tab, 1 Desci move

Analy tion chara

Ident

Mile

HYDI

The from trapo Glac uppe minor infilled depression trends offshore from the Don Valley. (Woodard-USGS) W73-02501

A REGIONAL GEOPHYSICAL INVESTIGA-TION OF THE GREEN BAY AREA, Michigan Univ., Ann Arbor. Great Lakes Research Div. N. W. O'Hara.

In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 355-367, 1971. 8 fig. 19

Descriptors: "Geological surveys, "Petrology, *Lake morphology, "Hydrogeology, "Lake Michigan, Data collections, Correlation analysis, Analytical techniques, Gravimeters, Magnetic stu-dies, Faults (Geologic), Glaciation, Lake basins, Wisconsin Michigan Wisconsin, Michigan.

Identifiers: *Green Bay area (Wisc), Aeromag-

netic data

Associated gravity and magnetic trends were qualitatively analyzed to correlate the structural trends and lithologic characteristics of the outcrops in Wisconsin and northern Michigan with the basement complex beneath the Green Bay area the basement complex beneam the Green Bay area of Lake Michigan. The regional aeromagnetic survey of the Green Bay area has delineated several east-west trending belts of positive and negative magnetic anomalies which have been related to corresponding gravity anomalies delineated by the hastoom excluded by the particular surjungers survey of Green Bay. The magnetic property of Green Bay. corresponding gravity anomalies delineated by the bottom-gravimeter survey of Green Bay. The magnetic and gravity trends have, in some cases, been related to basement lithologies in Wisconsin. Magnetic and gravity lows have been related to metasediments and felsic rocks. The magnetic high extending the property of th extending through the center of Green Bay and westward into Wisconsin appears to mark the in-tersection of two structural features having eastwest and northeast-southwest trends. Both gravity west and northeast-southwest trends. Both gravity and magnetic evidence support the eastward extension of the iron formation encountered in drilling near Escanaba, Mich. The -70 mgal Bouguer gravity minimum has been extended eastward into Green Bay from Wisconsin and Michigan. The into Green Bay from Wisconsin and Michigan. The gravity data offer no positive evidence to support the existence of a preglacial drainage system related to basement lithology and/or topography. The gravity and magnetic treands, extending across the southern portion of the Door Peninsula, correlate with the strike of two Paleozoic faults in this area. (See also W73-02498) (Woodard-USGS) W73-02502

HYDROGEOLOGY OF THE FORTY MILE CREEK DRAINAGE BASIN ON THE SOUTH SHORE OF LAKE ONTARIO, Ontario Water Resources Commission, Toronto.

Div of Water Resources

R. C. Ostry.

In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 368-386, 1971. 10 fig, 3 tab, 14 ref.

Descriptors: "Hydrogeology, "Groundwater movement, "Inflow, "Lake Ontario, "Canada, Analytical techniques, Observation wells, Correla-tion analysis, Watersheds (Basins), Aquifer tion analysis, Watersheds (Basins), Aquifer characteristics, Chemical properties. Identifiers: "Niagara Peninsula (Canada), "Forty Mile Creek (Canada), Ontario Province (Canada).

The groundwater contribution to Lake Ontario The groundwater contribution to Lake Ontario from the Niagara Peninsula was assessed by extrapolating data from the Forty Mile Creek drainage basin, an area considered to be typical of the groundwater regime developed in the area. Glacial till overlies the weathered and fractured upper part of the bedrock from which groundwater supplies were obtained. An observation-well network was established in the area to monitor the work was estaunished in the area to monitor the fluctuations of groundwater levels which appear to be quantitatively related to precipitation and evapotranspiration. This network was supple-mented with piezometric installations to obtain in-formation on aquifer characteristics and ground-water gradients. Chemical zonation of the ground-water gradients. Chemical zonation of the groundwater gradients. Chemical zonation of the ground-water, in conjunction with piezometric data, sug-gest that two flow systems (local and regional) ex-ist. Groundwater movement in the study area is slow and approximately 1/2 cfs of groundwater is being directly discharged into Lake Ontario from the Niagara Peninsula. (See also W73-02498) (Woodard-USGS)

LAKE ERIE NEARSHORE SEDIMENTS-FORT

ERIE TO MOHAWK POINT, ONTARIO,
Department of Energy, Mines and Resources,
Burlington (Ontario). Canada Centre for Inland

N. A. Rukavina, and D. A. St. Jacques. In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Ontario, Canada April 19-21, 1971: International Associa-tion for Great Lakes Research, p 387-393, 1971. 3

Descriptors: *Sedimentology, *Lake Erie, *Geology, *Bathymetry, Sands, Sediment transport, Mapping, Currents (Water), Littoral drift, Canada, Sampling, Data collections, Glacial drift, Bedrock. Identifiers: *Mohawk Point (Ontario).

Bottom samples, echo sounder records, and un-derwater television and diver observations were used to map the geology and bathymetry of the nearshore zone of northeastern Lake Eric. Nearshore materials consist of bedrock (25%), glacial drift (25%), and the recent sediments-sand (35%) and silt-sand (15%). Bedrock is exposed in the inshore half of the zone. Glacial drift occurs inshore at the western end of the area and offshore instore at the western end or the area and offshore in the central portion. Recent sediment is present on the submerged Port Maitland moraine, in the offshore half of the zone east of Point Abino, and as shallow-water bay deposits. The sand on the moraine is a lag deposit produced by reworking of underlying glacial drift. The eastern deposit and the bay sediments are from accumulation of sediment transported by eastward-moving longshore currents. The minimum depth at which offshore sand occurs varies across the area from 10-18 m. (See also W73-02498) (Woodard-USGS) 73-02504

NEW EVIDENCE FOR SPENCER'S LAU-RENTIAN RIVER, Waterloo Univ. (Ontario). Dept. of Civil Engineer-

O. I. White, and P. F. Karrow.

O.L. White, and P. F. Karrow. In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 394-400, 1971. 4 fig, 12 ref. NRC Grant A2690.

Descriptors: *Geologic history, *Great Lakes, *Rivers, *Theoretical analysis, *Reviews, Evaluation, Geologic time, Geologic formations, Hydrologic data, Sampling, Groundwater, Sedimentology, Boreholes, Geology, Correlation analysis

ysis. Identifiers: *Preglacial rivers, Buried valley.

In 1890, J. W. W. Spencer proposed that a major stream had, in preglacial times, drained the present Great Lakes area. The stream, referred to as the Laurentian River, was considered to flow in a valley which crossed the Ontario Peninsula from Georgian Bay to a point near Toronto on Lake On-tario. Since 1890, many other investigators have attempted to define more precisely the position of the valley, but to date none has been successful.

The results of recent investigations are presented, and, although not locating the position with certainty do contribute towards an understanding of the situation. The data seem to favor Spencer's original location of the valley southwest of Lake Simcoe and underlying the present Don River drainage in its southern extent. It is probable that the drainageway was still occupied at the end of the last interglacial, some 70,000 years ago, and that at least major portions of the Oak Ridges moraine were built after that time. (See also W73-02498) (Woodard-USGS) W73-02505

EXPERIMENTAL INVESTIGATION OF THE SPATIAL FORM OF LARGE INTERNAL WAVES IN A NEAR-SHORE REGION OF LAKE

HURON, Waterloo Univ. (Ontario). Dept. of Mechanical Engineering

In: Proceedings of 14th Conference on Great Lakes Research, University of Torono, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 555-569, 1971. 15 fig, 2

Descriptors: *Internal waves, *Lake Huron, *Thermocline, *Data collections, Offshore platforms, Analytical techniques, Investigations, Waves (Water), Wavelengths, Water temperature. Identifiers: Spatial form (Waves), Water waves.

In 1964 the thermal behavior at three towers in the vicinity of Douglas Point, Lake Huron was recorded. Analysis of these data reveals that the form of the internal waves is complex and depen-dent on the depth. The wave pattern is mot likely stationary or very slowly rotating, of large wavelength, and with considerable 'distortion' of the wave form perhaps resulting from energy transfer among the possible vertical modes of motransier among the possible vertical modes of mo-tion as the wave proceeds towards shore. The tem-perature recording system was the Model ARB6/122, six-channel spring-driven chart, chopper-bar type, manufactured by Hartmann and Braun. The temperature sensors were 100 ohm platinum resistance bulbs. The system could be calibrated using the reference resistance and adjustable resistances supplied with it. The six sensors were attached to each tower using wooden sors were attacked to each tower tuning wooden fixtures. The 6 v battery which operated the navigation light also provided power for the temperature recording system. At each tower the channels were sequentially selected at one minute intervals and the temperature recorded. The channels were color coded for easy identification. A profile of the water column temperature was completed every 6 min at each tower. The col-lected data are presented. (See also W73-02498) (Woodard-USGS) W73-02506

AN INVESTIGATION OF HORIZONTAL DIF-

TUSION IN LAKE ONTARIO,
Canada Dept. of Energy, Mines and Resources,
Burlington, Ontario, Inland Waters Branch. Department of Energy, Mines and Resources,
Burlington (Ontario). Canada Centre for Inland Waters. P. F. Hamblin.

In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 570-577, 1971. 2 fig, 1 tab, 13 ref.

Descriptors: *Dye releases, *Dye dispersion, *Diffusion, *Tracking techniques, *Lake Ontario, Water temperature, Current meters, Thermal stratification, Dispersion, Water quality, Path of pollutants, Fluorescent dye, Correlation analysis, Forecasting, Mathematical studies, Equations.

Field 02-WATER CYCLE

Group 2H-Lakes

Large-scale horizontal diffusion during a period of weak stratification in Lake Ontario was examined by means of a dye tracer and measurements of horizontal turbulent fluctuations with a moored current meter. The rapid horizontal dispersion of the instantaneous release of dye was associated with inhibited vertical mixing by a shallow thermocline. Eddy diffusivities determined from a current meter were in general agreement with those determined by the tracer method. Three pairs of drogues were placed at the depths of 2.5, 4.0 and 6.0 m and tracked (from an anchored ship) in the vicinity of the dye release. The dye release occurred at 1335 GMT, June 17, 199, and the patch was sampled between 1800-2000 GMT, June 18, at a depth of 2.5 m. A vertical profile of water temperature taken during the diffusion experiment shows that a sharply defined thermocline existed at a depth of approximately 6 m. The concentration contours of the dye patch in ppb are illustrated. (See also W73-02498) (Woodard-USGS) W73-02507

THE COASTAL BOUNDARY LAYERS OF A

LAKE, Case Western Reserve Univ., Cleveland, Ohio. Div. of Fluid, Thermal and Aerospace Sciences. G. S. Janowitz.

G.S. Janowitz.
In: Proceedings of 14th Conference on Great
Lakes Research, University of Toronto, Ontario,
Canada, April 19-21, 1971: International Association for Great Lakes Research, p 578-581, 1971. 6
fig, 2 ref. NSF Grant GK-05262.

Descriptors: "Boundary layers, "Lakes, "Shores, "Water circulation, "Air-water interfaces, Winds, Turbulence, Mathematical studies, Equations, Lake morphology, Currents (Water), Velocity, Fluid mechanics, Analytical techniques, Theoretical analysis, Evaluation.

The linear hydrostatic coastal boundary layers which bring the horizontal motion to rest at the shores of a lake of horizontal extent L and uniform depth H were investigated. The fluid is homogeneous and in a state of turbulent motion charac-terized by constant horizontal and vertical eddy viscosities. The motion is induced by a steady nonuniform wind stress applied at the free surface. The coastal boundary layer is composed of two overlapping layers of thickness. If the wind stress overlapping layers of inckness. If the wind stress is uniform, then there are regions near the shore where mixing of coastal waters and interior waters is prohibited. The theory further predicts conditions under which the upwelling of bottom waters is enhanced. (See also W73-02498) (Woodard-19020) W73-02508

WINTER CIRCULATION IN LAKE ONTARIO, Connecticut Univ., Groton. Marine Sciences Inst. D. F. Paskausky. In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 593-606, 1971. 21 fig, 8

Descriptors: "Water circulation, "Lake Ontario, "Winter, "Model studies, "Winds, Storms, Wind velocity, Mathematical studies, Meteorological data, Equations, Numerical analysis, Lake morphology, Air-water interfaces, Turbulence. Identifiers: Barotropic model.

A barotropic, prognostic, numerical circulation model that includes topographic, Coriolis, lateral and bottom friction, inertial, and wind terms was and bottom Inction, inertial, and wind terms was applied to Lake Ontario. A cyclonic wind field (maximum winds of 10 m/sec) simulating a storm was passed across the lake in an east to west direction in one day. As the northerly moving winds in the leading edge of the storm passed over the lake, an anticyclonic flow (high) developed. As the storm continued to move out over the lake the high moved with it and a cyclonic circulation (low) high moved with it and a cyclonic circulation (low) developed and intensified. When the storm left the lake the flow reverted to the steady-state. During the early part of the storm passage the direction of flow near the southern lake boundary became westerly and later in the storm passage reverted to easterly. On the northern boundary the flow direction shifted from east to west after half a day. (See also W73-02498) (Woodard-USGS) W73-02509

TRANSPORT IN THE BAROCLINIC COASTAL CURRENT NEAR THE SOUTH SHORE OF LAKE ONTARIO IN EARLY SUMMER.

LAKE ONTAKIO IN EARLY SUMMEN, State Univ. of New York, Albany. J. T. Scott, P. Jekel, and M. W. Fenlon. In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Ontario, Canada, April 19-21, 1971: International Associa-tion for Great Lakes Research, p 640-653, 1971. 8

Descriptors: *Water circulation, *Currents (Water), *Lake Ontario, *Shores, *Summer, Data collections, Winds, Velocity, Analytical techniques, Mathematical studies, Correlation analysis, Atmospheric pressure, Current meters, Water temperature, Boundary layers. Identifiers: *Baroclinic coastal current, Transport, Steady currents, Geostrophic transport

Actual measurement of transport was compared to computed baroclinic geostrophic transport for a 13 km cross-section normal to the south shore of Lake Ontario. The transport was predominantly along the shore in the coastal current which reached its maximum development from 4 to 8 km from shore. The current was set up by a typical summer storm and maintained by an eastward (alongshore) component of the wind but the amount of transport was quite sensitive to changes in the wind. Adjustment to baroclinic flow was rapid requiring perhaps less than two days. The mean eastward transport in this summertime mean eastward transport in this summertime baroclinic coastal current moves more water than the flowage of the Niagara-St. Lawrence Rivers. Therefore, return flow must occur either in deep water or near the lake center. This return flow may take several forms and is probably barotropic. (See also W73-02498) (Woodard-USGS) W73-02510

DEVELOPMENT OF NUMERICAL MODELS

OF LAKE ONTARIO,
Department of Energy, Mines and Resources,
Burlington (Ontario). Canada Centre for Inland

In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Ontario, Canada, April 19-21, 1971: International Association for Great Lakes Research, p 654-669, 1971. 10 fig. 1 tab. 22 ref.

Descriptors: *Water circulation, *Lake Ontario, *Winter, *Model studies, *Numerical analysis, Winds, Air-water interfaces, Lake morphology, Currents (Water), Analytical techniques, Equations, Diffusion, Movement, Resistance, Friction, Forecasting, Hydrologic data. Identifiers: Numerical models.

A numerical model of the circulation of Lake On-A numerical model of the chicaland of Lake On-tario in winter is described, when the water mo-tions in the lake can be simulated by an incom-pressible homogeneous fluid. The primitive equaons integrated in the vertical are utilized to predict the surface elevation along with the verticallyaveraged flow resulting from a wind stress im-posed on the surface of the lake. Included are the effects of the earth's rotation, nonlinear acceleradary configuration, bottom topography, lateral dif-fusion of momentum, and various representations of bottom friction. The individual effects of these ingredients of the model are evaluated, and the numerical techniques employed are discussed. The three-dimensional flow pattern is briefly discussed. (See also W73-02498) (Woodard-USGS) W73-0251

A WATER USE MAP OF THE GREAT LAKES BASIN,

Department of Energy, Mines and Resources, Burlington (Ontario). Canada Centre for Inland

waters.

T. R. Lee, and A. Beaulieu.
In: Proceedings of 14th Conference on Great
Lakes Research, University of Toronto, Ontario,
Canada, April 19-21, 1971: International Association for Great Lakes Research, p 677-680, 1971. 1 tab. 6 ref.

Descriptors: "Maps, "Great Lakes, "Water properties, "Water utilization, "Mapping, Waste disposal, Shores, Recreation facilities, Fisheries, Irrigation, Thermal stratification, Electric powerplants, Water resources, Environmental gradient, Social aspects, Economics. Identifiers: "Great Lakes Basin.

There is a great paucity of information on the so-cial and economic role of the water resource. The water use map of the Great Lakes is an attempt to bring together and put into meaningful form a large variety of information on water use from myriad fragmentary sources. The map has been con-structed to emphasize the man-water interface. The detailed phenomena shown on the map are all water use phenomena. Simificant characteristics water use phenomena. Significant characteristics of the water resource and social and economic system are shown either by marginal notations or surrogates. The water-related activities depicted include waste loads, shoreline use, fisheries, irrigation, thermal loadings and electricity genera-tion. The map is an attempt to represent the spatial context within which water use problems are con-tained in the Great Lakes Basin; in essence, the nature of the interaction between the human society in the basin and the water resource. (See also W73-02498) (Woodard-USGS) W73-02512

DIVING TECHNIQUES USED IN THE STUDY OF FERROMANGANESE NODULE DEPOSITS, Michigan Univ., Ann Arbor. Dept. of Meteorology and Oceanography.
L. H. Somers, and R. F. Anderson.
In: Proceedings of 14th Conference on Great Lakes Research, University of Toronto, Canada, April 19-21, 1971: International Association for Great Lakes Research, p. 720-730, 1971. 5 fig. 12 ref. NSF Grants GA-4507, GH-50, and GH-98 (Sea grant).

Descriptors: *Scuba diving, *Equipment, *Sampling, *Sediments, *Lake Michigan, Methodology, Underwater, Technology, Research and development, Data collections, Evaluation. Identifiers: Underwater diving techniques, Diving equipment, Ferromanganese nodule deposits.

Underwater techniques were used to study and sample ferromanganese nodule deposits in Green Bay (Lake Michigan). At each station a diver photographically documented the occurrence of nodules, took undisturbed cores, made detailed bottom observations and, using an air lift, collected large quantities of surficial sediment. Inherent disadvantages and limitations imposed by the use of SCUBA diving techniques prompted researchers to employ surface-supplied diving techniques for this project. Divers used steadyflow/demand masks, hot water circulating suits, and hard wire communications units. Using this recently developed lightweight equipment the diver retained freedom of movement, within the range of his umbilical, comparable to that of a SCUBA diver. Mission capabilities were greatly extended, the quality of data acquisition imnodules, took undisturbed cores, made detailed

proved, tained. W73-02

OBSER LETTU GUATE Florida

Souther 380, 197 Descrip Aquatic Identifi

H.R.H

In Sept populat tributar would that the tion on

TAXO

DANG

Minne

Health NEAR PERIC ON PE Minne Health For pr W73-0

FURT TAGG CUTT YELL Maine J. D. M Trans Identi Lakes Ultra

Thum clusiv side mech: Clear Clear under ment ward do n mech shifti proved, and higher standards of safety were maintained. (See also W73-02498) (Woodard-USGS) W73-02513

OBSERVATIONS OF DECLINING WATER LETTUCE POPULATIONS IN LAKE IZABAL, GUATEMALA, Florida Univ., Gainesville. Dept. of Plant Patholo-

8y. H. R. Hill, and R. E. Rintz. Southern Weed Science Society, Vol 25, p 374-380, 1972. OWRR B-011-FLA (3). 14-31-0001-3268.

Descriptors: *Aquatic weed control, *Biocontrol, Aquatic weeds, Floating plants, Lakes. Identifiers: *Lake Izabal (Guatemala), Pistia stratioites, *Guatemala, *Water lettuce.

In September 1971, a survey was made of Lake Izabal, Guatemala, in an attempt to determine why populations of water lettuce (Pistia stratioites) decline after being carried out to the lake from its tributaries. No phytopathogens were found that would explain this phenomenon. It was concluded that the demise of this free-floating plant was due to damage inflicted to them by wind and wave action on the lake and by the feeding activities of insects and other animals. (Morgan-Florida) W73-02549

TAXONOMY OF NORTH SHORE LAKE SUPERIOR, CASTLE TAXONOMI OF PERIPHYTON, LAKE SUPERIOR, CASTLE DANGER STUDIES 1970-1971, Minnesota Univ., Minneapolis. School of Public

Health For primary bibliographic entry see Field 05C. W73-02555

POLLUTION AND THE ECOLOGY OF NEARSHORE PERIPHYTON OF LAKE SU-PERIOR: THE EFFECTS OF CALEFACTION ON PERIPHYTON, Minnesota Univ., Minneapolis. School of Public Health.

For primary bibliographic entry see Field 05C. W73-02556

FURTHER ULTRASONIC TRACKING AND TAGGING STUDIES ON HOMING TAGGING STUDIES ON HOMING CUTTHROAT TROUT (SALMO CLARKI) IN

VELLOWSTONE LAKE, Maine Univ., Orono. Dept. of Zoology. J. D. McCleave, and G. W. La Bar. Trans Am Fish Soc. Vol 101, No 1, p 44-54, 1972.

Thus: Illus. Illus. Ildentifiers: Compass, *Cutthroat trout, *Homing, Lakes, Salmo clarki, *Tagging (fish), Tracking (fish), Trout, *Ultrasonic, Tracking, *Wyoming, *Yellowstone Lake.

Ultrasonic tracking of mature S. clarki from Little Thumb Creek displaced to the open water of Yel-lowstone Lake in 1969 suggested, but did not con-clusively demonstrate, that trout from the west side of the lake have a westward compass mechanism, similar to the eastward compass mechanism of east side trout. Anosmic trout from Clear Creek made variable movements, but some chear Creek made variable movements, but some exhibited the same patterns as control trout and homed. Experimental trout and control trout from Clear Creek retained prior to ultrasonic tracking under a 6 hour early photoperiod and a normal photoperiod, respectively, exhibited similar movements, most of which were eastward or southeastward as is typical of Clear Creek trout. Either they ward as is typical of Clear Creek trout. Either they do not use a time-compensated sun compass mechanism, or the experiment was unsuccessful in shifting the biological clock. Cloud cover apparently did not alter fish movement patterns. Half (49.5%) of 299 mature Clear Creek trout tagged and displaced to 5 release points homed. One third of each release group was blinded, 1/3 made anosmic, and 1/3 anesthetized only. Significantly fewer blind trout and insignificantly fewer anosmic trout homed than control trout. Blind trout were significantly slower to home than anosmic or control trout. There was no correlation between homing percentage and distance displaced, but homing time generally increased with increasing distance (except for those released just below the fish trap as a control).—Copyright 1972, Biological, Abstracts, Inc.

UTILIZATION OF ALEWIVES BY INSHORE PISCIVOROUS FISHES IN LAKE MICHIGAN, Michigan Dept. of Natural Resources, Marquette. Marquette Fisheries Research Station. Marquette Fish W. C. Wagner.

Trans Am Fish Soc. Vol 101, No 1, p 55-63, 1972.

Illus.
Identifiers: *Alewives, *Lake Michigan, Alosa pseudoharengus, Amia calva, Esox lucius, Fishes, Lakes, Lota lota, Michigan, Micropterus dolomieui, Osmerus mordax, Perca flavescens, *Piscivorous fishes, Stizostedion vitreum vitreum.

The exotic alewife (Alosa pseudoharengus) has become exceedingly abundant in Lake Michigan. During May-Aug. they migrate to inshore waters to spawn and may provide an abundant food supply for the inshore warm-water piscivorous fishes. Examined were stomach contents of 405 fishes. Examined were stomach contents of 405 northern pike (Esox lucius), 112 smallmouth bass normern puse (Esox lucius), 112 smallmouth bass (Micropterus dolomieui), 103 walleye (Stizostedion vitreum vitreum), 43 burbot (Lota lota) and 29 bowfin (Amia calva) from Little Bay de Noc in Lake Michigan, during April-Oct. of 1966-68 to determine their food habits when alewives were abundant and when alewives were access. Before alemine arrived in the access to the contract of scarce. Before alewives arrived in the spring, rain-bow smelt (Osmerus mordax) were the most important prey species in the diets. When alewives were abundant, they provided large percentages of the total weight of foods eaten: northern pike-66%, smallmouth bass-60%, walleye-71%, burbot-100% and bowlin-100%. After most alewives left 100% and bowfin-100%. After most alewives left in the fall, no single prey species predominated in the diets. Northern pike grew faster in Little Bay de Noc than in other waters, probable because they fed heavily on alewives and smelt. Northern pike and walleyes did not prey on the abundant yellow perch (Perca flavescens), a species which they normally feed, strongly suggesting that perch were buffered from these predators by the abundant alewives and smelt.—Copyright 1972, Biological Abstracts, Inc.

NOTE ON THE SWIMMING BEHAVIOR OF CHIRONOMUS PLUMOSUS LARVAE IN LAKE SUWA, (IN JAPANESE), Shinshu Univ., Matsumoto (Japan). H. Yamagishi, and H. Fukuhara. Jap J Ecol. Vol 20, No 6, p 256-257, 1971. Illus. En-

glish summary. Identifiers: *Fish behavior, *Chironomus plumosus, Hypomesus olidus, *Japan, Lakes, Larvae, Predators, Swimming, *Lake Suwa (Japan).

Swimming C. plumosus larvae were collected from the surface water layer using a fish larvae net in the daytime and at midnight of June 11, 1970 in Lake Suwa (eutrophic lake situated 759 m above Lake Sawa (eutrophic lake situated '79 m above sea level, with an area of 14.45 sq km and a maximum depth of 6.5 m, in central Japan). Based upon the comparison of the body length distributions of the larvae collected at the surface and bottom it is concluded that the Chironomus larvae from the first to the late 4th instar stages make strainering backers and strainering backers and state the uniquese condition swimming behavior under the windless condition both in the daytime and at night. This result sug-gests that the duration in which the larvae keep the gests that the duration in winch the intrack keep the swimming behavior is far longer than experimen-tally estimated by Nose (1961) and this behavior makes the larvae even at the 4th instar stage easily eaten by pond smelt (Hypomesus olidus), a typical zooplankton feeder inhabiting the lake.—Copyright 1972, Biological Abstracts, Inc. W73-02586

FREDING, DIETARY INTERRELATIONSHIPS OF FISH AND THE EFFECTIVENESS OF THEIR USE OF FOOD RESOURCES IN NATU-RAL BODIES OF WATER IN THE BYELORUS-SIAN POLESYA, II. DIET OF GOLDFISH IN

T. I. Nekhaeva, and V. P. Lyakhnovich Vesta Beloruss Univ. Vol 2, No 1, p 45-48, 1971. Identifiers: "Byelorussian polesya, "Diets (Fish), Feeding (fish), "Goldfish, "Lakes, Plankton, USSR, Zooplankton.

Goldfish in the Bobrovichskoe, Vygonovskoe and Cookins in the Boorovichskoe, y ygonovskoe and Chervonnoe Lakes consume various animals with a predominance of zooplankton and in some cases detritus. Daily rations for goldfish age 1-6 yr varied from 8-3.4% of body weight computed by vegetative period or 3.3-1.6% computed yearly. Food coefficients varied from 10.6-26.4 with a tendency for age-related increases. The effectiveness of the use of energy from assimilated food for growth varied from 0.24-0.09. The highest value for this coefficient was assigned to goldfish in Lake Chervonnoe.—Copyright 1972, Biological Abstracts, Inc. W73-02590

DISTRIBUTION OF FISH IN THE VOL-

GOGRAD RESERVOIR, (IN RUSSIAN), T. K. Nebol'sina, and G. N. Bratsenyuk. Tr Sarat Otd Gos Nuauchno-Issled Inst Inst Rchn Ozern Rybn Khoz. 10: p176-1971.

Identifiers: Bream, Catfish, *Distribution (Fish), Ide, Perch, *Pike perch, Reservoirs, Roach, Spawning, Sturgeon, USSR, *Volgograd Reser-

Common rheophiles such as the sturgeon, ides, bream and pike perch are most concentrated in the upper portion of the reservoir, substantially less concentrated in the central portion and are less common in the lower area. Roach, white bream, pike and juveniles of all species are found in the shallow waters of the left shore zone on former floodplain areas around the islands. The adult portion of the bream stock, catfish, pike perch, Volga pike perch, and others feed in the deep open zone of the reservoir. During spring spawning the majority of species enter the large and small rivers which flow into the reservoir. In the floodplain areas and in the channel lithophiles and many bream stop to spawn. Starting in July the concentration of fish in the channel increases. In Aug. and Sept. the fish are distributed more evenly over the channel. The area of the greatest concentration of fish remains constant from year to year. The basic portion of the catch at all trawling points consists of bream (70-90%), catfish (2-14%), then pike perch (1-17%).-Copyright 1972, Biological Abstracts, Inc. W73-02591

INTRODUCTION TO STUDY OF THE CHEMI-CAL RELATIONSHIPS BETWEEN THE SEDI-MENTS ON THE BOTTOM AND THE WATER OF THE LAKE OF GENEVA, For primary bibliographic entry see Field 05C. W73-02592

WEEKLY CHANGES OF THE BACTERIO- AND PHYTOPLANKTON STANDING STOCK IN LAKE BALATON AND IN THE HIGHLY EUTROPHIC LAKE BELSO, Magyar Tudomanyos Akademia, Tihany (Hungary). Biological Research Inst. For primary bibliographic entry see Field 05C. W73-02594

Group 2H-Lakes

COMPARATIVE INVESTIGATIONS ON THE BENTHIC FAUNA AT TWO SEWAGE IN-FLOWS OF LAKE BALATON, Magyar Tudomanyos Akademia, Tihany (Hunga-ry), Biological Research Inst. For primary bibliographic entry see Field 05C. W73-02595

PIKE RATIONS IN THE KREMENCHUNG RESERVOIR (IN RUSSIAN), Ukrainian Research Inst. of the Fish Industry,

RESERVOIR (IN RUSSIAN), Ulrainian Research Inst. of the Fish Industry, Kiev (USSR). T. V. Lapovaya. Gidrobiol Zh. Vol 7, No 2, p 128-131. 1971. Identifiers: Bream, *Kremenchug Reservoir, Perch, *Prike rations, Reservoirs, Roach, USSR.

The basic food of pike in the Kremenchug Reservoir during a year consists of white bream, roach and perch. A pike weighing 1 kg with a length of about 50 cm consumes 6.27 kg of fish during its lifetime, of which commerically valuable fish make up an insignificant portion. With age-related increases in yearly rations and in the nutritive coefficient, the number of valuable fish consumed increases.—Copyright 1972, Biological Abstracts, Inc. Inc. W73-02596

2I. Water in Plants

MORPHOLOGICAL CHARACTERISTIC OF ASPRO ZINGEL (L.) FROM THE LOWER DANUBE, (IN RUSSIAN), Akademiya Nauk URSR, Kiev. Instytut Zoologii. A. I. Smirnov. Vopr Ikhtiol. Vol 11, No 5, p 932-934. 1971. Identifiers: "Aspro zingel, "Fish physiology, Characteristics, "Danube River, Eye location, Fish morphogry IUSS Fish morphology, USSR.

Aspro represents a rare species of fish without Aspire represents a rate species of irsh without economic importance and their biology and morphology is not well known. Morphological comparison with different groups of Aspro was studied. The variations in eye location in different groups was observed which is believed to be consented with difference in the facility accelery and groups was observed which is betieved to be con-nected with differences in the feeding ecology and water velocity of the river. The experimental results were statistically analyzed.—Copyright 1972, Biological Abstracts, Inc. W73-01998

DISTRIBUTION OF THE WATER CHESTNUT TRAPA NATANS L. S. L. IN THE FLOOD-PLAINS OF BODIES OF WATER IN THE VLADIMIR OBLAST AND THEIR HYDROCHEMICAL CHARACTERIZATION,

(IN RUSSIAN),
M. P. Shilov, and T. N. Mikhailova.
Gidrobiol Zh. Vol 7, No 3, p 57-60, 1971.
Identifiers: Calcium, Distribution, *Floodplains,
Hydrochemical condition, Iron, Magnesium,
Sulfate, Trapa natans-o, *Vladimir oblast, *Water
chestnut, USSR.

The relict water chestnut Trapa natans prefers weakly acidic or neutral (pH 6.5-7.0) soft water (general hardness 1.3-3 mg/1) with 0.1-1.0 mg/Fe, 14.0-100.0 mg/1 of sulftates, 13.0-21 mg/Ca and 0.8-1.2 mg/1 Mg. The presence or disappearance of the plant is a sensitive indicator of hydrochemical conditions.—Copyright 1972, Biological Abstracts, Inc.

DIATOMS FROM SEVEN IOWA RIVERS, Iowa State Univ., Ames. Dept. of Botany and Plant Pathology. J. J. Hungerford. Iowa State J Sci. Vol 46, No 3, p 375-379, 1972. Identifiers: *Diatoms, *Iowa, *Plankton, Rivers, Lakes, Benthic forms, Epiphytic forms. Comparative diatom population counts from 7 rivers on the same day show a total of 71 taxa in the plankton samples containing benthic, epiphytic and lake forms as well as plankton species.—Copyright 1972, Biological Abstracts, Inc. W73-02011.

CHARACTERISTICS OF STRUCTURE AND ANTIEROSIVE ROLE OF ROOT SYSTEMS OF WOODY AND SIRUE SPECIES IN ERODED LANDS OF THE VOLYN-PODOLIAN UPLAND (IN RUSSIAN), I.P. Terebukha.

Ukr Bot Zh. Vol 28, No 3, p 351-355. 1971. Illus.

Okr Bot Za. Vol Zs. No 3, p 331-333. 1971. Inns. English summary. Identifiers: Betula-Verrucosa-D, Carpinus-Betulus-D, Corylus-Avellana-D, Eroded lands, "Erosive control, Larix-Decidua-G, Physocarpus-Opulifolia-D, Quercus-Robur-D, Robinia-Pseudoscacia-D, "Root systems, Shrubs, Species, "Volya-Podolian (USSR), USSR.

Quercus robur L., Larix decidua Mill., Carpinus betulus L., Robinia pseudoacacia L., Betula verrucosa Ehrh., Corylus avellana L., Physocarpus opulifolia (L.) Maxim. had the best root systems for erosion control. The root systems were examined by excavation.—Copyright 1972, Biological Abstracts, Inc. W73-02055

VEGETATION OF THE AREA OF THE FU-TURE RESERVOIR ON THE KLENOVSKA RIMAVA, Komenskeho Universita, Bratislava (C-zechoslovakia). D. Miadok

Acta Fac Rerum Nat Univ Comenianae Bot. 19 p 215-224. 1971.

Pratensis-M, Anthoxanthum-Odoratum-M, Bromus-Mollis-M, *Czechoslovakia, *Klenovska Reservoir, Rimava River, Scirpus-Sylvaticus-M, *Vegetation, Willow-D.

Most of the area to be flooded by the reservoir is covered by mesophilic meadows with Alopecurus pratensis L. The present dry Rimava River bed, which is periodically covered by water is covered by an association with Scirpus sylvaticus L. Bromus mollis is the predominant species in the association which occurs regularly along the agreedation which occurs regularly along the agreedation which occurs regularly along the agreedation which seems given An association. association which occurs regularly along the ag-gradation wall of the entire river. An association with Anthoxanthum odoratum as the predominant species occurs at the relatively driest areas, the deposits of tributaries of the Rimava. Forest as-sociations are represented by willow-alder stands of the association Aegopodio-Alnetum Karpati V.I. et Jurko 1960. These occur along the banks of the entire river.—Copyright 1972, Biological Ab-stracts. Inc. stracts, Inc. W73-02087

DACE (LEUCISCUS LEUCISCUS L.) FROM THE UPPER VISTULA AND CZARNA PRZEM-

SZA,
Polish Academy of Sciences, Krakow. Zaklad
Biologii Wod.
M. Klimczyk-Janikowska.
Acta Hydrobiol. Vol 13, No 3, p 343-361. 1971. Il-

Identifiers: Biometric analysis, *Czarna Przemza, *Dace, Food, *Leuciscus-Leuciscus, Plants, *Poland, *Vistula River.

A basic biometric and food analysis of L. leuciscus L. from the Upper Vistula and Czarna Przemsza was carried out on populations of typical forms. The varieties, morpha majalis Agass, and morpha rodens Agass, were not found. The investigated populations of dace were compared with those from the Czarna Staszowska River and from the rivers of the Lodz Upland. With regard to plastic and meristic features, the dace did not generally differ from those of the populations compared.

However, dace from the Czarna Przemsza River had fewer vertebrae and scales on the lateral line than those from other populations. Sex dimorphism appeared in the length of the pectoral and ventral fins, which were longer in males than in females. Dace from the investigated populations fed both on plant and animal food and in others exclusively on either plants or animals.—Copyright 1972, Biological Abstracts, Inc.

W73-02090

W73-

THE NOR Nort

ENV OF GRO

Haw B. K Pac: Iden

viros Man rhize Tem

Six were

of s

trac

test

sph

3 z tion

pro

gro 370

Pug

roc

TE LE AI WIN O. Be lui Id di-

In the se for process of the process

ECO-PHYSIOCLOICAL STUDIES ON DESERT PLANTS: V. INFLUENCE OF SOAKING AND REDRYING ON THE GERMINATION OF EXPOPPHYLLUM COCCINEUM SEEDS AND THE POSSIBLE CONTRIBUTION OF AN INHIBITOR TO THE EFFECT, Technische Hochschule, Munich (West Germany) Institut fuer Angewandte Botanik. K. H. Batanouny, and H. Ziegler. Oecologia (Berl). Vol 8, No 2, p 209-217. 1971. English summary. Identifiers: Desert plants, Drying, *Germination (Seeds), Inhibitor, Lepidium-Sativum-D, Light, Physiological studies, Plants, *Soaking, *Zygophyllum-Coccineum-D, *Redrying.

*Zygophyllum-Coccineum-D, *Redrying.

The rate and percentage of germination of soaked and redried seeds are higher than those of untreated seeds. The promoting effect of soaking and redrying of seeds on germination increases with the duration of soaking. Seeds that germinated during soaking are unable to tolerate drying. Exposure of the seeds to light after the first 8 hr of soaking inhibits germination of the seeds after drying. Washing the seeds with water has no effect on germination in the dark at 25C, while it promotes germination in the dark at 25C, while it promotes germination in Lepidium seeds has no significant effect on the dark germination of these seeds. On the other hand, it inhibits the light germination Cermination of Lepidium sativum seeds is not affected by the leachate of Zygophyllum seeds, either in the dark or in light. When the washed seeds of Z. coccineum are germinated, their radicles are longer and the hypocotyls shorter than in the controls. The leachate promotes hypocotyl growth and inhibits that of the radicle. A hypothesis is suggested to interpret the results based on the assumed interaction between seeds, light and an inhibitor.—Copyright 1972, Biological Abstracts, Inc. W73-02093

DIFFUSION RESISTANCE OF LEAVES IN CONNECTION WITH THEIR ANATOMY (IN

CONNECTION WITH THE RESIDENCY OF THE RUSSIAN), Akademiya Nauk Estonskoi SSR, Tartu. Institut Fiziki i Astronomii. A. Laisk, V. Oya, and M. Rakhi. Fiziol Rast. Vol 17, No 1, p 40-48, 1970. Illus. En-

glish sumary.
Identifiers: Anatomy, "Carbon dioxide, Diffusion resistance, "Leaves, Mesophyll, Photosynthesis, Resistance, Respiration, "Stomata.

The CO2 and water diffusion resistances were measured in 13 angiosperm spp. Stomatal parameters (stomata number, stomata slit and tube lengths) and the exposed internal surface of the leaves were measured for the same plants. It is assumed that the anatomically possible maximal slit width does not exceed 1/2 the slit length. The minimal stomatal resistances determined experimentally never dropped below the minimal values calculated theoretically. The mesophyll resistance for a given species was not constant. For each species the minimal values obtained were correlated with those calculated on basis of leaf anatomy. Leaf anatomy determines the maximal rate of net The CO2 and water diffusion resistances were with those calculated on basis of leaf anatomy. Leaf anatomy determines the maximal rate of net photosynthesis. Under natural conditions addi-tional limiting factors will appear, such as respira-tion, closing of stomata and increase of mesophyil resistance. The latter may be of a diffusional or chemical nature.—Copyright 1972, Biological AbW73-02133

THE MISSOURI RIVER PLOODPLAIN NORTH DAKOTA, North Dakota State Univ., Fargo. For primary bibliographic entry see Field 04A. W73-02185 THE FOREST OVERSTORY VEGETATION ON

ENVIRONMENTS AND THE DISTRIBUTION OF MICROFUNGI IN A HAWAIIAN MAN-OF MICROFUNGI IN A HAWAIIAN MANGROVE SWAMP,
Hawaii Univ., Honolulu. Dept. of Botany.
B. K. H. Lee, and G. E. Baker.
Pac Sci. Vol 26, No 1, p 11-19, 1972. Illus.
Identifiers: Dendryphiella salina, Distribution, Environment, "Fungi, Growth, "Hawaii (Oahu),
Mangrove D, "Micro fungi, Robillarda rhizophorae, Roots, Salinity, Mangrove swamp, Temperature. Temperature.

Six species of microfungi isolated from Heeia mangrove swamp on the island of Oahu, Hawaii, were used to study growth responses to varying salinity levels from 6% to 72%; combined effects of salinity from 6% to 72% and temperature from 10C to 37C; and mangrove root extract and soil extract as supplements to the basal medium. Isolates tested were selected from different salinity levels and originated either from the root of the rivotested were selected from different salinity levels and originated either from the root or the rhizosphere (soil). For salinity tolerance maximum growth correlated with the saline level of the habitat of the isolates, in turn correlating with the 3 zones extending from seaward to inland locations. Only 1 isolate, Robillarda rhizophorate Kohlm. followed a typical 'Phoma-pattern producing the best low-temperature growth at low seawater salinity and the best high-temperature growth at high salinity. None grew well at 10C or 37C and one, Dendryphiella salina (Sutherland) Pug et Nicot, showed no growth at these temperatures. Additions of mangrove root extract and soil extract to the basal medium showed a selective effect on growth. Pungi isolated from the mangrove root grew best in the root-extract supplemented medium and those from the soil showed increased growth with soil extract as a supplement.—Copygrowth with soil extract as a supplement.—Copyright 1972, Biological Abstracts, Inc. W73-02189

THE FUNCTIONAL ADAPTATION OF LICHENS TO ECOLOGICAL CONDITIONS OF ARID AREAS, Wierzburg Univ. (West Germany). Botanisches

Institut II. O. L. Lan

Ber Deut Bot Ges. Vol 82, No 1/2, p 3-22. 1969. Il-

lus. Identifiers: Adaptation, Arid regions, *Carbon dioxide, Dew, Ecological studies, *Israel, *Lichens, Ramalina maciformis.

that I sraeli Negev desert with a rainfall of less than 100 mm Ramalian maciformis is the predominant lichen. Laboratory experiments were performed using CO2 gas exchange as a measure of photosynthetic activity in relation to environment. The data were checked by field measurements. The CO2 levels were measured by a URAS (IR absorption recorder) instrument. The dry thallus of R. maciformis gained 0.146 mg c/g of lichen following a morning dew which represents a 0.40 pro mille increase of the thallus. In Avdat dew was present 198 days in a year which accounts for the good growth of the lichens under arid conditions.—Copyright 1972, Biological Abstracts, Inc. W73-02193

ECOLOGICAL OBSERVATIONS ON SOL-DANELLA VILLOSA DARRACQ, Museum National d'Histoire Naturelle, Paris (France). P. Jovet Fragm Florist Geobot (Krakow). Vol 16, No 1, p

161-170, 1970. Illus.

Identifiers: Ecological studies, Moisture, *Phenology, Soils, *Soldanella villosa D, *Pyrenees Mountains, Hydrogen ion concentra-

S. villosa is an endemic of the Western Pyrences. Phytocenoses phenology and the pH values of soil and running streams are given. This species is abundant in humid environments where surface water is plentiful. Commonly growth occurs on steep and shady slopes where the pH of the soil ranges from 4 to 6.5.—Copyright 1972, Biological Abstracts, Inc.

RECORDS ABOUT ECOLOGY OF SOME CHARACEAE SPECIES FROM THE FLOOD-PLAIN OF THE DANUBE, (IN RUMANIAN), Bucharest Univ. (Rumania).

An Univ Bucur Biol Veg. 19. p 183-192. 1970. En-

edish summary. Identifiers: *Characeae species, *Danube River, Ecology, Floodplains, *Phenology, Records, Spe-cies, Water temperature.

Data are given about the nature of substratum, variation of the depth of the water temperature and phenology.—Copyright 1972, Biological Abstracts, Inc.
W73-02249

CHOROLOGY, ECOLOGY AND SOCIOLOGY OF CHIMAPHILA UMBELLATA (L.) BART. IN SLOVENIA (YUGOSLAVIAIA), Institut za Biologijo Sazu, Ljubljana (Yugoslavia).

M. Wraber. Fragm Florist Geobot (Krakow). Vol 16, No 1, p 171-182, 1970, Illus

Identifiers: Associates, *Chimaphila umbellata D, Chorology, Climate, Ecology, *Pinus sylvestris G, Sociology, *Yugoslavia.

Seventy-nine locations of C. umbellata were found in Yugoslavin and in 2 principle regions, the Near-Alpian and the Sub-pannonian zones. This species bears a thermal-zerophilic relationship to clusters of Finus sylvestris throughout these regions and in Yugoslavia the species grows well in a subaltantic-subcontinental climate. C. umbelata grows well in subcontinental cimate. C. unbeata grows well in a humid environment, and is generally found in areas located 300-500 m above sea level and even at altitudes of 600-700 m. In Yugoslavia, this species is characteristic of the Myrtillo-Pinetum autopannonicum.—Copyright 1972, Biological Abstracts, W73-02272

CONTRIBUTION TO THE ECOLOGY OF CIR-SIUM PALUSTRE (L.) SCOP, Agricultural Univ., Wageningen (Netherlands). G. O. Nifland, and K. Wind. Landbouwhogsch Afd Landbouwplantenteelt Graslandcult Gestencilde Meded. 20. p 1-34. 1970. Illus. Maps.

Identifiers: *Cirsium palustre D, Ecology, *Marsh thistle, Potassium, *Thistle D.

In an experimental field, in the midst of a lowlying pasture, there appeared to be a close correla-tion between the presence of marsh thistle (C. pa-lustre) and the relative altitude of the terrain. This hustre) and the relative altitude of the terrain. This species is found almost exclusively in the lower part of the ground cover that would be cut for making hay. This appears to be the result of the widely fluctuating moisture available to the low parts, which are wet in winter and extremely dry in summer. The distribution of other species of plants on this experimental field was studied by examining plants situated in low and high, unfertilized and K-enriched portions. As in the case of C palustre, the distribution of other varieties of plants was strongly correlated with the varying altitude (water level, bottom profile).—Copyright, 1972, Biological Abstracts, Inc. W73-02279

THE AMBIENT ENVIRONMENT OF LICHENS AS A FUNCTION OF EXTERIOR ATMOSPHER-IC CONDITIONS EXISTING IN THE LOCALI-

TY,
G. Pueyo.

Rev Bryol Lichenol. Vol 37, No 2, p 367-371. 1970.

Identifiers: *Ambient environment, Atmospheric conditions, Carbohydrates, Environment, Humidity, *Lichens, Light, Lobaria pulmonaria, *Metabolism, Ricasolia herbacea, Temperature.

Glucide metabolism was studied in Ricasolia her-bacea and Lobaria pulmonaria as a function of the atmospheric conditions. Control specimens were left growing in situ and others were removed to the laboratory. Humidity, light, and temperature were important factors. Humidity increased the sugar important factors. Humidity increased the sugar content, except for the free monosaccharides, for 2 mo. after a 2 mo. exposure period. Cold increased the sugars and poly-alcohols in the 2 lichens after 3 mo. High light intensity triggered an elevation in the free monosaccharides of R. herbacea during the first few weeks and an increase in bacea during the arrist few weeks and at increase in heteroside levels in both species at the end of 2 mo. Other meteorological factors such as at-mospheric pressure, cloudiness, water vapor, wind, rain, and fog, have indirect, secondary ef-fects compared to the others.—Copyright 1972, Biological Abstracts, Inc.

NEW CASES OF AQUATIC EPIPHYTES, (IN

SPANISH), Instituto Nacional de Limnologia, Santo Tome (Argentina). N. M. Tur.

N. M. Tur.
Bol Soc Argent Bot. Vol 13, No 4, p 243-249. 1971.
Illus. English summary.
Identifiers: Aquatic plants, "Argentina, Azolla p
spp, Eichhornis crassipes M, "Epiphytes,
Hydrocotyle ranunculoides D, Ludwigia peploides
D, "Parana River, Pistia stratiotes M, Rivers, Salvinia herzogii P, Scirpus cubensis M.

Scirpus cubensis var. paraguayensis was seen on Pistia stratiotes, Azolla spp. and Eichhornia cras-sipes. Hydrocotyle ranunculoides and Ludwigia peploides were seen on Salvinia herzogii. The rela-tionship (support mechanism) between epiphyte peptoides were seen on Savvina nerzoga. Inc rear-tionship (support mechanism) between epiphyte and floating plant is emphasized. Interlacing of stems, stolons and roots was observed. Micro-scopical observation showed the twisting of absorbent hairs of the epiphyte on the little roots of the support plants. Observations were made on the Parana River.—Copyright 1972, Biological Abstracts, Inc. W73-02551

THE RESPONSE OF ROOT AND SHOOT GROWTH TO DECREASES IN SOIL WATER POTENTIAL, Montana Univ., Missoula. Dept. of Resources

Conservation.

Conservation.
M. E. Majerus.
M. S. Thesis, 1972, 64 p, 19 fig, 6 tab, 87 ref.
OWRR A-046-MONT (2).

Descriptors: *Soil water, *Moisture tension, *Soilwater-plant relationships, *Plant growth, Root systems, Root development, Water requirements.

Available soil moisture is a major causal factor involved in species distribution and abundance. Water is no more indispensable to plants than is light or temperature, but it can be considered of great importance due to the involvement of water in a large number of vital functions. In regions of wet winters and dry summers especially, the soil acts as the reservoir supplying water to the plant during the growth season. The rate of use and time of exhaustion of the available moisture supply depends greatly on the physical and physiological characteristics of the species. Root elongation and

Field 02-WATER CYCLE

Group 21-Water in Plants

leaf elongation of three grass species were moni-tored while growing in soils with favorable moisture conditions (control) and soils with decreasing soil water potential (treatment) brought about by use of a nonrenewable moisture supply. Specifically, blue gamma and Western wheat grass tolerated low soil moisture potentials while water potential of little bluestem were relatively higher. (Holje-Montana) W73-02558

SOLAR RADIATION ABSORPTION BY LEAFLESS HARDWOOD FORESTS, Forest Service (USDA), Durham, N. H. Northeastern Forest Experiment Station. C. A. Federer.

Agric Meteorol. Vol 9, No 1/2. p 3-20. 1971. Illus. Identifiers: *Absorption, *Albedo, Forests, *Hardwood forests, Leafless, Mathematical models, Radiation, Snow, *Solar radiation.

Variations in the solar radiation regime of a deciduous forest in winter have never been analyzed. When snow is on the ground, roughly 65% of the incident radiation is absorbed by stems and branches and 20% is reflected; the remaining 15% is absorbed by the snow. However, these pro-15% is absorbed by the snow. However, these proportions vary greatly according to the solar zenith angle, the ratio of direct to diffuse radiation, the ground or snow albedo, and canopy characteristics. A canopy model has been developed based on a uniformly absorbing crown space and a stem space of randomly arranged vertical cylinders. The crown-space parameter includes a crown absorption coefficient and must be found empirically, but the stem-space parameter is fully specified by the basal area, mean diameter, and mean tree height. With the beam radiation fraction and snow abbedo as further independent variables, the model gives the fractions absorbed by the canopy and by the snow and gives the albedo of the stand. Field tests using silicon photocells in 3 forests demonstrated the validity of the model.—Copyright 1972, Biological Abstracts, Inc. W73-02569

HYDROBIOLOGICAL RESEARCH ON AM-STERDAM ISLAND: 1969-1970 EXPLORATORY CAMPAIGN, Laboratoire de Biologie Vegetale, Nancy

J. F. Pierre, and P. Noel.

J. F. Pierre, and P. Noei. Bull Acad Soc Lorraines Sci. Vol 10, No 2, p 101-111, 1971. Illus. Map (English summary). Identifiera: Algae, *Amsterdam Island, *Biotopes, Ecology, Hydrobiological studies, Indian Ocean, *Islands, Oceans, Seals.

Descriptions are given of some freshwater biotopes of this Indian Ocean island. Temperature and pH, and actions of seals on a pond near the base of Is Roche Godon are studied. A short list of algae is published with some ecological annotations.—Copyright 1972, Biological Abstracts, Inc. W73-02582

STANDING CROPS OF ELEMENTS AND ATOMIC RATIOS IN A SMALL MAMMAL COMMUNITY, Savannah River Ecology Lab., Aiken, S.C. For primary bibliographic entry see Field 05A. W73-02584

2J. Erosion and Sedimentation

DETERMINATION OF TRACE METAL POLLU-TANTS IN WATER RESOURCES AND SEDI.

Ohio State Univ., Columbus. Water Resources Center. For primary bibliographic entry see Field 05A. W73-01958

THE EVOLUTION OF COASTAL SAND DUNES, Aberdeen Univ. (Scotland). Dept. of Geography. W. Ritchie. Scottish Geographical Magazine, Vol 88, p 19-35, 1972. 12 fig, 2 plate, 17 ref.

Descriptors: *Dunes, *Beaches, *Geomorphology, Sedimentary structures, Vegetation effects, Wind erosion, Sediment transport, Coasts, Dune sands, Provenance.

Identifiers: *Scotland.

Approximately 20% of the coastline of the Highlands of Scotland is fringed by sand accumulations in the form of dunes, links or machair. Except where sea walls and promenades protect their seaward edge, dunes are intimately linked to cept where sea walls and promenades protect their seaward edge, dunes are intimately linked to beaches, the margin between dune and beach being a fluctuating zone which is dominated in turn by encroaching waves or prograding vegetation. The largest sand surfaces are found in the machair Plains of the Uists; long stretches are also found on the Caithness coast, the south coast of the Moray Firth and Aberdeenshire. Where there are no landward barriers sand often encroaches far inland: 3 miles at Culbin and over 1 mile at Dunnet Bay. Except for zones of erosion or primary deposition along the coastal edge the sand dunes of Scotland are vegetated surfaces. Two further factors compound the morphological development of Scottish coastal sand dune areas: wind patterns and winter flooding. Nowhere in Scotland is there a coastal area with unidirectional wind flow comparable to the steady winds of the dry topical deserts. For the greater part of any year coastal Scotland receives amounts of precipitation greater than evapotranspiration. The prerequisite of dry sand for movement does not exist for long periods of time over large tracts of Scottish sand surfaces. In wet times erosional processes concentrate on the drier hillecks and ridges and the low-lvine flats In wet times erosional processes concentrate on the drier hillocks and ridges and the low-lying flats become reception areas with the sand being laid in thin layers across the waterlogged surfaces. The unn tayers across the waterlogged surfaces. The dunes and machair areas appear to be at a stage where erosion, redeposition and frequently general coastline retreat are the main features of their evolution. (Knapp-USGS) W73-02035

WATER RESOURCES DATA FOR COLORADO, 1971: PART 2. WATER QUALITY RECORDS. Geological Survey, Lakewood, Colo. For primary bibliographic entry see Field 02K. W73-02039

FEEDBACK RELATIONSHIPS IN GEOMORPHOLOGY, Nottingham Univ. (England). Dept. of Geography. C. A. M. King. Geografiska Annaler, Vol 52A, No 3-4, p 147-159,

Descriptors: *Geomorphology, *Erosion, Glaciers, Stream erosion, Sedimentation, Beaches, Sediment transport, Discharge (Water), Waves (Water).
Identifiers: *Feedback processes.

Feedback relationships are important in several major types of geomorphic processes. In fluvial processes negative feedback is dominant, and leads to the development of longitudinal river profiles in many different conditions. In glacial erosional processes positive feedback is dominant and leads to increased irregularity in the longitudinal profile of glaciated valleys. In beach processes negative feedback is common in very short-term changes. In the medium-term changes longshore movement is fundamental and lack of feedback between two adiacent stretches of beach longshore movement is fundamental and lack of feedback between two adjacent stretches of beach allows continuous change to take place. Adjacent stretches of beach may have a positive or negative relationship between the up-wave section and the down-wave section. Some changes are cyclic, varying from positive to negative and back again through the cycle. (Knapp-USGS) W73-02040 HYDROMETEOROLOGICAL RELATIONSHIPS AND THEIR EFFECTS ON THE LEVEES OF A SMALL ARCTIC DELTA, Louisiana State Univ., Baton Rouge. Coastal Studies Inst. For primary bibliographic entry see Field 08D. W73-02041

ICE-CORED MORAINES IN SOUTHERN BRITISH COLUMBIA AND ALBERTA. BRITISH COLUMBIA AND ALBERTA, CANADA, Stockholm Univ. (Sweden). Dept. of Physical Geography.
For primary bibliographic entry see Field 02C. W73-02042

an / of : Kat com the gog Gra arid vall plan in Obl US cha from W7

SU IN TH

(POREAL STIKE

19

De M W bi

T st mti C le P

FROST CRACKING IN THE COLORADO FRONT RANGE, Colorado Univ., Nederland. Inst. of Arctic and Alpine Research. For primary bibliographic entry see Field 02C. W73-02043

THE ORIGIN OF FLUTED MORAINE AT THE FRONTS OF CONTEMPORARY GLACIERS, Wroclaw Univ. (Poland). Inst. of Geography. S. Baranowski. Geografiska Annaler, Vol 52A, No 1, p 68-75, 1970. 6 fig, 1 tab, 22 ref.

Descriptors: *Glacial drift, *Topography, *Geomorphology, *Till, *Ablation, Sedimentation, Sediment transport, Scour, Deposition (Sediments), Groundwater, Glaciers, Regimen, Movement, Glaciology.

Identifiers: *Fluted moraines.

Fluted moraine surfaces at the front of Werenskioldbreen in southwest Spitsbergen are a normal phenomenon, especially at places without erosion by ablation water. The formative mechanism is by abatton water. The formative mechanism is primarily connected with frost action modified by ice movement. Such processes may exist if, due to climatic changes including thickness variations, there is a change of the thermal regime from warm to cold at the glacier bed. This alteration progresses within the glacier in accordance with its progresses within the gateer in accordance with its movement. The presence of fine silt in the ground moraine under the glacier makes it possible for water to gather. This is considered to be an impor-tant condition for the formation of fluted moraine ridges. (Knapp-USGS) W73-02045

BEDFORMS OF THE TANA RIVER, NORWAY, Deposal Univ. (Sweden). Dept. of Physical Geography.

For primary bibliographic entry see Field 02C.
W73-02047

SOIL EROSION AND CHANNEL PROCESSES. NO. 2. (EROZIYA POCHV I RUSLOVYYE PROTSESSY. VYPUSK 2.). Moscow State Univ. (USSR).

Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, 1972, 212 p.

Descriptors: *Soil erosion, *Soils, *Channels, Gullies, Rivers, River basins, Watersheds (Basins), Mudflows, Sands, Sediments, Runoff, Meteorology, Geomorphology, Mineralogy, Soil chemistry, Agriculture, Erosion control, Land reclamation, Biomes, Mapping.

Identifiers: *USSR, Sod-Podzolic soils, Afforestation, Phytoralization. tion. Phytomelioration.

This collection of 9 papers is concerned primarily with erosion and channel processes in different parts of the USSR. Individual topics include: (1) erosion phenomena in the Vazuza River basin in the Smolensk and Kalinin Oblasts; (2) soil erosion in the Kabardino-Balkarian ASSR in the central

Caucasus; (3) mudflows in the Kabardino-Balkarian ASSR; (4) erosion characteristics and dynamics of mudflows in the Baksan River basin in the Kabardino-Balkarian ASSR; (5) mineralogical composition and properties of wind-eroded solls in the Transvolga steppe region bordering the Volgograd and Saratov Oblasts; (6) investigations of Gray Cinnamon-Brown, gypsum-bearing soils in arid subtropics of the Euphrates and Khabur River valleys in connection with erosion processes; (7) planting of black alder on sands of the Don River in the Kalachevskiv forest area of Volsograd planting of black aider on sands of the Loon River in the Kalachevskiy forest area of Volgograd Oblast; (8) new cartographic data on gullies in the USSR; and (9) channel formation, stability, and changes in a reach of the Ob River downstream from Novosibirsk. (Josefson-USGS)

SUBSURFACE WATER AS A MAJOR FACTOR IN THE FORMATION OF LANDSLIDES ON THE LEFT BANK OF THE CHIRCHIK RIVER (PODZEMNYYE VODY-OSNOVNOY FAKTOR FORMIROVANIYA OPOLZNEY LEVOBE-REZBYYA CHIRCHIKA), Akademiya Nauk Uzbekskoi SSR, Tashkent. In-

stitut Seismologii.

stutt Seismogn. K. A. Artykov. Uzbekskiy Geologicheskiy Zhurnal, No 5, p 72-75, 1970. 1 fig, 1 tab.

Descriptors: *Landslides, *Subsurface waters, *Water types, Confined water, Connate water, Meteoric water, Springs, Moisture content, Wetting, Porosity, Loess, Mudflows, Slopes, Stabilization, Erosion control.

Identifiers: *USSR, *Uzbek SSR, *Chirchik

To develop effective landslide control measures, a study was made in April-May 1969 of the complex mechanism of slope movements of extremely thick loess deposits in the region of the Karankul' Chimgan, and Khodzhikent landslides along the left bank of the Chirchik River in Uzbekistan. The primary cause of the landslides was the high natural moisture content of the loess, which often exceeds its liquid limit. The major factor responsib for the landslides was subsurface water, which contributed significantly to the high natural moisture content of the deposits. Meteoric water frequently infiltrated to a depth of as much as 1.5 m. Stabilization of mudflows and landslides was attributable to the appearance of subsurface water at the surface in the form of springs after a landslide. Such landslides included those at the 8-km mark on the Gazalkent-Chimgan road along the Gel vasay River and those at Khodzhikent and Gazalkent. Despite the complex topography of the slopes, no other cases of landslides in the area have been recorded. Landslides are formed at the contact betweenloess deposits and bedrock through which artesian water moves. Landslide control measures in the area are designed to sharply reduce the natural moisture content of loess by draining interstitial artesian water at the surface of contact. (Josefson-USGS)

HILLS CREEK RESERVOIR TURBIDITY STU-

DY, Oregon State Univ., Corvallis. Water Resources

Research Inst.
For primary bibliographic entry see Field 05C.
W73-02092

METHODS OF RELIEF STUDIES FOR EVALUATION OF THE POTENTIAL DANGER OF WATER EROSION OF SOILS (IN RUSSIAN), I. I. Podskochii, and G. P. Shestoperov. Izy Kuibyshev S-Kh Inst. Vol 26, No 2, p 172-179.

Identifiers: *Erosion, Methods, Soils, *Soil erosion, USSR, Kuibyshev region (USSR).

Soil erosion studies demand quantitative relief parameters, including the dissection by gullies and ravines, depths of the major local base levels of ravines, depths of the major local base levels of erosion, average surface gradients and average length of slopes. Methods are described for determination of these relief parameters and compilation of interpretative maps for the territory of the Kuibyshev Region, with the purpose of using the data for evaluation of the potential danger of manifestations of erosion by water. The methods are based on the principles advanced by S. S. Sobolev (1948) and M. M. Turovtsev (1958), with specified modifications. The modifications improve the accuracy of the data and enhance their value.—Copyright 1972, Biological Abstracts, Inc. W73-02128

SEDIMENT VIELDS OF WISCONSIN STREAMS.

Geological Survey, Madison, Wis. For primary bibliographic entry see Field 07C. W73-02152

A CONTRIBUTION TO THE SEDIMENTARY PETROLOGICAL DESCRIPTION OF THE MAAS DEPOSITS IN SOUTHERN LIMBURG

MAAS DEPOSITS IN SOUTHERN LIMBURG (THE NETHERLANDS), Amsterdam Univ. (Netherlands). Lab. for Physical Geography and Soil Science. P. A. Riezebos. Geologie en Mijnbouw, Vol 50, No 3, p 505-514, May-June 1971. 8 fig, 1 tab, 17 ref.

Descriptors: *Sedimentology, *Pleistocene epoch, *Alluvium, *Mineralogy, Iron oxides, Topog-raphy, Geomorphology, Sedimentation, Sediment transport, Provenance. Identifiers: *Netherlands.

From the Plio-Pleistocene series of sediments deposited by the river Maas on the Late Tertiary peneplain of southern Limburg (The Netherlands) three samples, one of Pliocene and two of Pleistocene age were analyzed. The Pleistocene materials deviate from the Pliocene especially in having a large content of goethite particles. It is suggested that the great amount of goethite may be of use to discern the Quaternary Maas deposits from other contemporary fluviatile sediments. (K-napp-USGS) napp-USGS) W73-02153

TIDAL DEPOSITS AND THEIR SEDIMENTARY

STRUCTURES, Utrecht Rijksuniversiteit (Netherlands). Sedimentology Div. For primary bibliographic entry see Field 02L. W73-02154

THE FREQUENCY DISTRIBUTION OF THE CURRENT SPEED AT THE NETHERLANDS LIGHTVESSELS AND ITS POSSIBLE INFLUENCE ON THE COMPOSITION OF SEIDMENTS IN THE SOUTHERN NORTH SEA, Royal Netherlands Meteorological Inst., de Bilt. L. Otto. Geologie en Mijnbouw, Vol 50, No 3, p 475-478, May-June 1971. 2 fig, 7 ref.

Descriptors: "Currents (Water), "Sediment transport, "Bottom sediments, Velocity, Ocean currents, Tides, Particle size. Identifiers: "North Sea.

Frequency distributions of current velocities were requesty distinctions of the received when the received we determined from measurements at the Netherlands lightvessels in the North Sea. Near the lightvessel 'Texel' the frequency distribution shows a considerable degree of symmetry. By means of a simple model for transport of sediment the consequences of such a frequency distribution for the transport of particles of different sizes are investigated. There appears to be a distinct max-

imum in the transporting velocity for a particle size of about 300 microns, a value that corresponds with a relative poverty of partic between 200 and 300 microns downstream of position of the lightvessel. (Knapp-USGS) W73-02155

TENTATIVE DATA ON FLOW RESISTANCE IN SUSPENSION CURRENTS, Groningen Rijksuniversiteit (Netherlands).

Groningen F Geological Inst. Ph. H. Kuener

Geologie en Mijnbouw, Vol 50, No 3, p 429-442, May-June 1971. 13 fig, 1 plate, 1 tab, 16 ref.

Descriptors: *Turbidity currents, *Flow resistance, *Viscosity, *Sediment transport, Suspended load, Density currents, Drag, Roughness (Hydraulic), Fluid friction, Shear drag, Clays, Silts.

Turbidity currents carry large volumes of sand for great distances on slight slopes of the deep-sea floor with great efficiency. This seems to argue against high flow resistance by 'jostle' viscosity and floor impacting. The grading of the deposits is inexplicable by thin, dilute currents because these would have to be fed at the origin over a period of dozen because the great to grantly the observed. a dozen hours or longer, to supply the observed volume of larger beds, and with decreasing grain size. High densities (over 1.16) seem more probable than great thicknesses (over 100 m). Experi-ments on viscosity of suspensions showed oderate values up to densities of 1.2 for clay and 1.5 for mainly sandy mixtures. Eddies large in comparison with the grain size do not meet serious obstruction by jostling. Measurements in the cir-cular flume of bottom drag for suspension currents indicate that resistance is less than for clear water on a cohesive rough bottom of the same grain size less than twice that of clear water on a smooth and less man twice that of clear water on a smooth hard floor. Densities of 1.16 up to 1.5 as deduced from velocity and thickness of the currents and from grading in the turbidities are not associated with high flow resistance. (Knapp-USGS) W73-02156

THE EFFECTS OF SELECTIVE EROSION BY OVERLAND FLOW ON THE ICE-PUSHED RIDGES OF UELSEN (COUNTY BENTHEIM,

GERMANY), Amsterdam Univ. (Netherlands). Lab. of Physical

Amsterdam Univ. (Netneriands). Lab. of Physical Geography and Soil Science.
P. D. Jungerius, and A. J. Wiggers.
Geologie en Mijnbouw, Vol 50, No 3, p 425-428,
May-June 1971. 3 fig, 9 ref.

Descriptors: *Geomorphology, *Pleistocene epoch, *Overland flow, Erosion, Topography, Glacial drift, Gravels, Paleoclimatology. Identifiers: *Uelsen (Germany).

The surfaces of the ice-pushed rridges of Uelsen, Germany, are marked by parallel ridges of Pleistocene material rich in gravel, and intervening depressions in gravel-free Pleistocene and Tertiary deposits. This relief results from selective erosion by runoff in a humid temperate or a nivation cli-mate. Later periglacial conditions with solifluction mate. Later pergactal concurons with somutous and wind action disrupted the drainage system and suppressed the relief. Present geomorphic processes tend to diminish the effects of the preglacial environment. (Knapp-USGS) preglacial e

CONTENTS AND BEHAVIOUR OF MERCURY AS COMPARED WITH OTHER HEAVY METALS IN SEDIMENTS FROM THE RIVERS RHINE AND EMS, Institute for Soil Fertility, Haren-Gronigen

(Netherlands).
For primary bibliographic entry see Field 05B.
W73-02158

Group 2J-Erosion and Sedimentation

SOME SEDIMENTOLOGICAL ASPECTS OF THE FLUVIOGLACIAL OUTWASH PLAIN NEAR SOESTERBERG (THE NETHERLANDS), Utrecht Rijksuniversiteit (Netherlands). Geologi-

Cal Inst.
P.G. E. F. Augustinus, and H. Th. Riezebos.
Geologie en Mijnbouw, Vol 50, No 3, p 341-348,
May-June 1971. 5 fig, 6 photo, 9 ref.

Descriptors: *Alluvial fans, *Glacial drift, *Gravels, *Sands, *Alluvium, Sedimentation, Sedimentary structures, Deposition (Sediments). Identifiers: *Outwash plains, *Netherlands.

The fluvioglacial outwash plain near Soesterberg (The Netherlands) is a deposit, built up during the melting of the Saalian ice, by a braiding river system on the ice-free side of the ice-pushed ridge of Amersfoort. The variation in the grain-size distribution of the sediment is great. Sorting is very poor to moderate. This indicates a high stream relacity, though fluctuating compliance and the humanic of the sediment of the s poor to moderate. Inis moncates a high stream velocity, though fluctuating, combined with a huge supply of debris. Parallel to the principal stratification plane, bedded strata alternate frequently with depressions, which are filled up laterally, showing a 'festoon lamination'. (Knapp-USGS) W73-02159

EROSION AND DEFLATION OF SOILS (IN

RUSSIAN), V. M. Borovskii.

Tr Inst Pochvoved Akad Nauk Kaz SSR. 19: p 24-40. 1970.

Identifiers: Agriculture, Climate, *Erosion, *Kazakhstan (USSR), *Soils, USSR, Wind, *Soil

Erosion of soils occurs everywhere under natural conditions, but is very slight on grassy plains. The denudation rate is augmented hundreds, sometimes thousands of times, by bringing the lands under cultivation, as a result of the destruction of vegetation, loosening of soil and destruction of its structure. Erosion in Kazakhstan is facilitated by the arid climate, open steepe terrain, and naturally weak soil structure. The total area of lands in the republic that are notentially threatened here republic that are potentially threatened by vigorous erosion is 70.1 million ha, 52.4 millions of which are threatened by wind erosion and 17.7 millions by water erosion. Extensive erosion studies were done in Kazakhstan over the last 15 yr, and were done in Kazakhstan over the last 15 yr, and erosion control measures were developed. Erosion control agricultural practices are being vigorously implemented on a large area of erosion-prone plowlands in the northern regions of Kazakhstan. However, further work is necessary on several aspects of erosion control. Publicity for erosion control must be disseminated on a large scale, in the first place through the general secondary schools. A bibliography with 62 references is given. Copyright 1972, Biological Abstracts, Inc. W73-02163

DIFFUSIVITY OF SUSPENDED MATTER IN THE CARIBBEAN SEA,
Texas A and M Univ., College Station. Dept. of

Texas A and M OHIV., Conege Station. Dept. of Oceanography. T. Ichiye, N. J. Bassin, and J. E. Harris. Journal of Geophysical Research, Vol 77, No 33, p 6576-6588, November 20, 1972. 7 fig. 3 tab., 21 ref. ONR Contract N00014-68-A-0308-0002 NSF Grants GA-1296 and GA-26498.

Descriptors: *Suspended load, *Diffusivity, *Sea water, *Ocean currents, Currents (Water), Sedi-mentation, Sediment transport, Sedimentology, Turbulence, Sampling, Gravimetric analysis. Identifiers: *Caribbean Sea.

Total suspended matter was determined by gravimetric analysis at nine stations in the Caribbean Sea. Vertical eddy diffusivities near the surface and bottom were calculated by applying a simplified diffusion equation to the mean vertical prolites. The eddy diffusivities range from 1 to 8 sq cm/sec for the upper layer down to about 150

meters, but they are smaller in the bottom region up to about 80 meters from the bottom, ranging from 0.2 to 2 sq cm/sec. Mid-depth (300 to 1500 meters) maximum concentrations in the eastern meters) maximum concentrations in the eastern stations are interpreted as advection of securing at the sill depth of the Mona passage. The transport equation balanced with horizontal advection and vertical diffusion terms yields a solution that can be fitted to the vertical distributions near the middepth maximums, resulting in estimates of advection velocity of about 1 cm/sec and vertical eddy diffusivity of 5-10 sq cm/sec. (Knapp-USGS) W73-02171

SEDIMENTATION CHARACTERISTICS OF GORGE-TYPE RESERVOIRS, Windsor Univ. (Ontario). Dept. of Civil Engineer-

S. P. Chee, and A. P. Sweetman. Water Resources Bulletin, Vol 8, No 5, p 881-886, October 1972. 1 fig, 14 ref.

Descriptors: *Sedimentation, *Reservoir silting, *Sediment transport, *Hydraulic models, Deposi-tion (Sediments), Streamflow, Currents (Water), Hydraulics, Bed load, Suspended load, Mannings equation.
Identifiers: *Reservoirs (Gorge-type).

An investigation of the hydraulics of gorge-type reservoirs was conducted with scale models. Reservoir shapes were moulded within a large basin. Uniform sediments (specific gravity 2.65) with mean diameters of 0.20 mm and 0.60 mm were utilized. Sedimentation patterns were studied from the commencement of sediment inflow until the final stage of a fully silted reservoir. The mode of deposition of the sediment beds, the mechanics of transportation, and sediment bed slopes were investigated in relation to the factors which vesugated in relation to the factors which in-fluence it, which include sediment characteristics and flow parameters. Bed slopes and flow depths were analyzed by various methods; the Kalinske equation in conjunction with the Manning and Ein-stein-Barbarossa relations as proposed by Doland and Chow produced the best results. (Knapp-USGS) W73-02179

NATIONAL SHORELINE STUDY, REGIONAL INVENTORY REPORT. NORTH ATLANTIC Corps of Engineers, New York. North Atlantic

For primary bibliographic entry see Field 08B. W73-02186

SEDIMENT CONTROL, Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 05G. W73-02200

A GENERAL STOCHASTIC MODEL FOR THE TRANSPORT OF SEDIMENT BED MATERIAL, Colorado State Univ., Fort Collins. Dept. of Civil

Engineering. H. W. Shen, and P. Todorovic.

Paper presented at International Symposium on Stochastic Processes, May 31-June 2, 1971, Pitt-sburgh University, Dept. of Civil Engineering, 14 p, 9 ref. OWRR B-014-COLO (3) NSF Grants 11744, GK11499.

Descriptors: *Sediment transport, *Bed load, *Stochastic processes, Statistical models, Sedimentation, Mathematical models, Statistics, Probability, Statistical methods.

Identifiers: *Stochastic models.

A general stochastic sediment transport model based on less restrictive assumptions than those developed previously is formulated. The exact functional form for the probability distribution function to describe the longitudinal displacement runction to describe the longitudinal displacement of a sediment particle is still not known and, perhaps, should be determined by a comprehensive data collection diagram. The model describes longitudinal motion of a sediment particle which moves on the sediment bed in a series of alternative. ing transport and rest periods. A particle may roll along the bed, jump as saltation, and/or be suspended by the flow. (Knapp-USGS) suspended b

fan. erod

of d from prob grad ry c

over

SUS MA Joh

Bay J. R Che

Riv

sho Sur abo

cu

me loc mo co dis

rei Al W

OYTECKEN

RECENT SEDIMENTS OF THE CENTRAL CALIFORNIA CONTINENTAL SHELF-PILLAR POINT TO PIGEON POINT: PART B. MINERALOGICAL DATA, California Univ., Berkeley. Hydraulic Engineering

Lab

J. Lee, M. Glogoczowski, T. Yancey, and P.

J. Lee, M. Urogoczowan, 1. 1 amer, amer. Wilde. Available from NTIS, Springfield, Va 22151 AD-728165; Price \$3.00 paper copy. Report HEL-2-30, June 1971. 63 p., 1 fig, 6 ref.

Descriptors: *Sedimentology, *Particle size, *Continental shelf, *California, Data collections, Sampling, Methodology, Sediments, Streams, Beaches, Coasts.
Identifiers: *Central California, Offshore samples.

The heavy mineralogy of the sand fraction for 44 offshore, 9 beach, and 3 stream samples for the central California continental shelf is determined optically. For each sample the percentage of the more abundant or more diagnostic transparent minerals is plotted graphically in order of persistence and additional data on accessory transparent minerals, opaques, and composite grains (rock fragments) are listed. The treated size fractions were divided further by separation in the heavy liquid tetrabrom-ethane with a density of 2.95 gms/cc were called heavy. Particles with a density equal or less than 2.95 gms/cc were designated light. Grain mounts were made of both the heavy and light particles of each size fraction on glass slides with Cadex mounting media (index of refraction = 1.55) (Woodard-USGS) W73-02319

HAWAII REGIONAL INVENTORY OF THE NA-TIONAL SHORELINE STUDY. Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Engineer Div. For primary bibliographic entry see Field 08B.

W73-02321

A RANDOM-WALK SIMULATION MODEL OF ALLUVIAL FAN DEPOSITION, Arizona Univ., Tucson. Dept. of Hydrology and Water Resources. W. E. Price, Jr.

w. E. Frice, Jr. Technical Report No. 7, June 1972. (Doctoral dis-sertation of same title completed by author in April, 1972). OWRR A-020-ARIZ (7) 14-01-0001-1622.

Descriptors: *Simulation analysis, *Alluvial fan, *Markov processes, *Sedimentation, *Model studies, Flow, Erosion, *Deposition (Sediments). Identifiers: *Digital models, *Random walk, *Stochastic models, *Monte Carlo simulation.

A digital model based on a random walk is used in A digital model based on a random walk is used in an experiment to determine how well such a model is able to simulate alluvial-fan deposition. The model is in three dimensions and consists of six principal dynamic elements: (1) relative uplift of the mountain area containing the source basin, (2) a storm producing flow on the fan, (3) change in thickness of weathered material in the basin, (4) a random well of a flow outs the fan (3) denseits. random walk of a flow onto the fan, (5) deposition of sediment on the fan, and (6) erosion. Relative uplift and storms are regarded as independent stochastic events. The type of storm flow upon the

Erosion and Sedimentation—Group 2J

fan, whether a depositing debris or water flow, or eroding water flow, depends upon the thickness of erodible material in the source basin. The pattern of deposition is determined by a random walk from the canyon mouth at the mountain front; the from the canyon mouth at the mountain front; the probable direction of each step is governed by the gradient, the momentum of flow, and the boundary conditions. Deposition occurs instantaneously over the entire route of flow as a bed tapered in the downstream direction. Erosion of the main stream into its rock channel above the fan and on the fan itself is modeled.

W73-02342

SUSPENDED SEDIMENT DISCHARGE OF THE SUSQUEHANNA RIVER AT CONOWINGO, MARYLAND, DURING 1969, Johns Hopkins Univ., Baltimore, Md. Chesapeake

Bay Inst. J. R. Schubel.

J. R. Schubel. Chesapeake Sci. Vol 13, No 1: p 53-58. 1972. Illus. Identifiers: *Conowingo (Md), Discharge (Sediments), Maryland, Rivers, *Sediments (Suspended), *Susquehanna River.

The suspended sediment yield of the Susquehanna River in 1969 at Conowingo, Maryland is estimated to have been approximately 0.32 x 1,000,000 short tons). The mean water discharge of the Susquehanna in 1969 at Conowingo was only about 684 m cu/sec (24,146 cfs (cu ft/sec), or about 70% of its long term average discharge of 985 m cu/sec 34,791 cfs). The estimated suspended sedicuises 34,791 calls, The estimated suspended sedi-ment discharge is based on daily water discharge records of the Conowingo Hydroelectric Plant located approximately 15 km upstream from the mouth of the River, and on determinations of the concentration of suspended sediment in the discharge water every day during the spring period of high runoff and on alternate days during the remainder of the year.--Copyright 1972, Biological Abstracts, Inc. W73-02445

OXIDATION-REDUCTION POTENTIALS, OXYGEN CONCENTRATION AND OXYGEN UPTAKE OF PROFUNDAL SEDIMENTS IN A BUTROPHIC LAKE,

Copenhagne Univ. (Denmark). Freshwater Biological Lab. For primary bibliographic entry see Field 05C.

W73-02451

SOUND ATTENUATION IN MARINE SEDI-

MENTS, Naval Undersea Research and Development Center, San Diego, Calif.

E. L. Hamilton.

Available from the National Technical Informa-tion Service as AD-741 201. \$3.00 in paper copy, \$9.95 in microfiche. Research Report NUC TP 281, March, 1972. \$0 p, 8 fig, 8 tab, 100 ref. TASK, 00539 SF11-552-101.

Descriptors: *Sound waves, *Attenuation, *Sediments, *Oceans, Accoustics, Physical properties, Particle size, Porosity, Moel studies, Methodology, California.
Identifiers: *Underwater accoustics, *Sea floor,
Sound velocity, Viscoelastic models.

Those characteristics of the sea floor that affect propagation of acoustic energy in the sea were determined off the coast of San Diego, California, from the research submersible 'Deepstar', and by scuba diving in shallow water during 1968-1970. In situ measured values of velocity, attenuation, and associated physical properties of marine sedi-ments are reported; pertinent literature data analyzed; relationships between frequency, velocity, attenuation, and other physical properties, causes of attenuation, elastic and viscoelastic models are discussed. A method derived allows prediction of attenuation, given sediment mean

grain size or porosity. Attenuation is related, approximately, to the first power of frequency. There is no significant dependence of sound velocity on frequency. Aviscoelastic model is recommended in which, after eliminating negligible factors, energy damping (as expressed by quality factor, specific attenuation factor, or logarithmic decrement) is independent of frequency (in the range of most interest), and linear atcy (in the range of most increasy, and mear at-tenuation is proportional to the first power of frequency, and velocity dispersion is negligible or appear the dominant cause of attenuation in watersaturated sediments. Viscous losses due to relative movement of pore water and mineral frame are probably negligible. (Jones-Wisconsin) W73-02467

CHARACTERISTICS OF ESTUARINE SEDI-MENTS OF THE UNITED STATES, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02L. W73-02481

WISCONSIN BOULDER FLOW AND ITS GEOMORPHIC IMPLICATIONS, FRANKLIN MOUNTAINS, EL PASO COUNTY, TEXAS, Texas Univ., El Paso. Dept. of Geological E. M. P. Lovejoy.

Geological Society of America Bulletin, Vol 83, No 11, p 3501-3508, November 1972. 6 fig, 17 ref.

Descriptors: "Mass wasting, "Alluvium, "Frost action, "Texas, "Pleistocene epoch, Rockslides, Talus, Degradation (Slope), Rock glaciers, Slopes, Geomorphology.

Identifiers: "Franklin Mountains (Tex).

An alluvial deposit of Pleistocene age with surface features similar to those of rubble streams, rock glaciers, or debris flows occurs in Tom Mays Park Canyon in the northern Franklin Mountains between 5,100 and 5,900 ft elevation. The deposit was too low for formation of interstitial ice during the Wisconsin glaciation. The deposits may have resulted from major flash-flood deposition of rock-fall talus-slope accumulations, resulting from intense frost action. This flow was uniquely responsive to an ephemeral Wisconsin frosty cli te. Maximum erosion in this canyon since middle Wisconsin is about 40 ft in stream alluvium and nil on talus slopes. The term boulder flow is proposed. (Knapp-USGS) W73-02487

RE-EVALUATION OF THE RELATIONSHIP OF MASTER STREAMS AND DRAINAGE BASINS. Texas Univ., El Paso. Dept. of

I.E. Mueller.

Geological Society of America Bulletin, Vol 83, No 11, p 3471-3474, November 1972. 1 fig, 2 ref.

Descriptors: *Geomorphology, *Erosion, *Channel morphology, *Drainage patterns (Geologic), Profiles, Topography, Tributaries, Valleys, Profiles, Topography, Geologic control, Streams.

A general or best-fit equation is offered which describes more accurately the length-area relationship for moderate and large-size drainage systems than the specific equation describing the relation-ship of stream length to drainage area originally formulated for very small rivers and basins in lo calized areas of the eastern United States. Use of the same equation for larger rivers and basins on a worldwide scale produces gross error of predic-tion. The theoretical implications of the general equation are just the inverse of those inherent in the original equation. (Knapp-USGS) W73-02488 HYDRAULIC PARAMETERS CONTROLLING BEDFORM MIGRATION ON AN INTERTIDAL SAND BODY, Illinois Univ., Urbana. Dept. of Geology. For primary bibliographic entry see Field 02L. W73-02489.

FIELD MAPPING AND COMPUTER SIMULA-FIELD MAPPING AND CUMPUTER SIMULA-TION OF BRAIDED-STREAM NETWORKS, Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences. W. C. Krumbein, and A. R. Orne. Geological Society of America Bulletin, Vol 83, No 11, p 3369-3380, November 1972. 8 fig. 1 tab,

Descriptors: *Braiding, *Alluvial channels, *Mapping, *Simulation analysis, Mathematical models, Geomorphology, Topography, Surveys, Terrain analysis, Meanders, Sediment discharge, Sediment load.

Small but complete braided stream units were mapped quickly to record the minor islands and mapped quickly to record the minor islands and channels, as well as to measure relative discharge in the channels. Some islands are less than 0.5 m in length, and minor channels may be as narrow as 20 cm, with flowing water less than 1 cm in depth. Topological analysis showed good agreement with expected proportions of the four possible kinds of links generated by combinations of bifurcations (forks) and junctions. A simulation model was bested on the number of channels in supplier as until the second of the purplier of channels in supplier as until the second on the second on the second of the number of channels in supplier as until the second on the second on the second on the second on the second of the second on the second of the second of the second of the second on the second of the second on the second on the second of the (torks) and junctions. A simulation moder was based on the number of channels in equally spaced cross sections through the braid. The model yields output in fair topological agreement with short braided segments of measured input. Enclosure-length distributions in nature and simulation outlength distributions in nature and simulation output differ markedly, however, especially in the
number of very short enclosures produced by
simulation. Neither aerial photographs nor
published maps are wholly satisfactory for
detailed studies of braided streams. Rapid field
mapping is essential for defining the initial stages
of braid generation, inasmuch as the smallest components, especially those less than 1 m long, appear to change shortly after new bifurcations occur. (Knapp-USGS)
W73-02490

MORPHOLOGY AND RECENT SEDIMENTS OF

MORPHOLOGY AND RECENT SEDIMENTS OF THE WESTERN ALBORAN BASIN IN THE MEDITERRANEAN SEA, Florence Univ. (Italy). Inst. of Geology. C. Bartolini, C. Gehin, and D. J. Stanley. Marine Geology, Vol 13, No 3, p 159-223, October 1972. 26 fig, 2 tab, 88 ref.

Descriptors: *Bottom sediments, *Turbidity currents, *Stratigraphy, *Provenance, *Sedimentation, Sedimentology, Sedimentary Sounding, Sampling, Particle size.

Identifiers: *Mediterranean Sea.

The sediments of the Western Alboran Basin Plain, in the Mediterranean 90 km south of Malaga, have a simple structure. Precise echo sounding was used to record the detailed subbottom structure to a depth of 30 m, and 49 cores were taken. Turbiditic graded and laminated layers were found in most of the cores. The sedimentological evolution of such layers was studied by means of the grain-size and petrographic proper-ties. These properties changed with distance down the basin slopes, while in the basin plain, where 'sediment ponding' occurs, no appreciable selec-tive power of the currents can be inferred. Most of the sand and silt layers fall within the range of feldspathic graywackes. The grain-size distribu-tions of the turbiditic layers are positively skewed. tions of the unrounce layers are positively sacwed.
Only a few samples from the proximal areas are relatively clean silts or sands, featuring a nearly symmetrical frequency distribution. The others contain a large quantity of fines. By relying on the isochronous turbiditic layers the sedimentation rates inferred by the stratigraphic analysis were

Group 2J—Erosion and Sedimentation

extrapolated to the whole cored area. These appeared to range from about 2 cm/1,000 years in the marginal areas to 40 cm/1,000 years in the central, deeper part of the Basin Plain. (Knapp-USGS) W73-02494

REWORKED PALYNOMORPHS FROM THE WEST ICE SHELF AREA, EAST ANTARCTICA, AND THEIR POSSIBLE GEOLOGICAL AND PALAEOCLIMATOLOGICAL SIGNIFICANCE, Florida State Univ., Tallahassee. Dept. of Geolo-

E. M. Kemp. Marine Geology, Vol 13, No 3, p 145-157, October 1972. 1 fig, 1 tab, 34 ref.

Descriptors: *Antarctic, *Glaciology, *Paleoclimatology, *Palynology, Quaternary period, Glacial drift, Provenance, Sedimentology, Sedimentation, Erosion, Antarctic Ocean, Sampling.
Identifiers: *West Ice Shelf (Antarctica).

Identifiers: *West Ice Shelf (Antarctica).

Glacial marine sediments in the vicinity of the West Ice Shelf, East Antarctica, contain abundant recycled spores, pollen and microplankton. Analysis of the reworked spore and pollen aggregates in terms of the known ranges of constituent species indicates that they derive from the erosion of Permian, Lower Cretaceous, and uppermost Cretaceous to Lower Tertiary strata. The microplankton component suggests that the Ecocene part of the eroding sequence was deposited under marine conditions. Physical and geological considerations suggest that a source for the recycled material lies somewhere in the West Ice Shelf-Prydz Bay area. The presence of pollen of probable Ecocene age in this part of East Antarctica is of paleoclimatological interest, suggesting that forest cover existed in the region at that time. Previous studies have indicated that parts of West Antarctica were vegetated during the same interval. Such evidence for widespread vegetation cover is not compatible with ice-sheet development to continental proportions during the Ecocene. (Knapp-USGS)

SEDIMENTARY EVIDENCE OF BOTTOM CUR-RENT ACTIVITY, STRAIT OF GIBRALTAR REGION,

University Coll. of Swansea (Wales). Dept. of Geology. G. Kelling

G. Kelling, and D. J. Stanley.

Marine Geology, Vol 13, No 3, p M51-M60, October 1972. 3 fig, 17 ref.

Descriptors: *Currents (Water), *Straits, *Sedimentary structures, *Ripple marks, Density currents, Ocean currents, Water circulation, Bottom sediments, Sediment transport. Identifiers: *Straits of Gibraltar.

Powerful and persistent westward-directed bottom currents are shown by oriented photographs of the sea bed, together with grab and short-core sediment samples, at 18 stations in the Strait of Gibraltar. Sedimentary structures and textures provide data on the direction and strength of this bottom flow. These data are consistent with existing hydrologic observations of the Mediterranean understand. dercurrent. Two major depressions (Gibraltar canyon and Ceuta canyon) traverse the eastern end of the Strait and are characterized by more tranquil sedimentation and spasmodic do canyon transport of sediment. (Knapp-USGS) W73-02496

RADIOMETRIC EVIDENCE FOR RECENT FORMATION OF PHOSPHATIC NODULES IN MARINE SHELF SEDIMENTS, Akademiya Nauk SSSR, Moscow. Institut Oke-anologii.

anologii. G. N. Baturin, K. I. Merkulova, and P. I. Chalov. Marine Geology, Vol 13, No 3, p M37-M41, Oc-tober 1972. 1 tab, 22 ref.

Descriptors: "Radioactive dating, "Bottom sediments, "Phosphates, Uranium radioisotopes, Water chemistry, Chemical precipitation, Deposition (Sediments), Sedimentation, Sedimentology, Geochemistry.

"Phosphate nodules, "Marine

The U-234/U-238 ratio in diatom oozes from South West Africa shelf is as high as 1.175, slightly lower (1.163) in enclosed phosphatic modules, and still lower (1.143) in similar nodules from Chile shelf. The absolute age calculated using these data is 24,000 years for the South West African nodules and 55,000 years for the Chilean nodules. The age of lithified phosphorites from the ocean floor is older than Upper Pleistocene. However, the soft phosphatic nodules found in the surface sediment layer of the South West African and Chilean shelves are young. Formation of phosphorites is not exclusively ancient but may proceed under the conditions prevailaing in the oceans of today. (Knapp-USGS)

SEISMIC PROFILING AND GEOLOGY OF THE TORONTO WATERFRONT AREA OF LAKE ONTARIO,

Geological Survey of Canada, Ottawa (Ontario). For primary bibliographic entry see Field 02H. W73-02501

LAKE ERIE NEARSHORE SEDIMENTS-FORT ERIE TO MOHAWK POINT, ONTARIO, Department of Energy, Mines and Resources, Burlington (Ontario). Canada Centre for Inland

Waters. For primary bibliographic entry see Field 02H. W73-02504

NEW EVIDENCE FOR SPENCER'S LAU-RENTIAN RIVER, Waterloo Univ. (Ontario). Dept. of Civil Engineer-

For primary bibliographic entry see Field 02H. W73-02505

DIVING TECHNIQUES USED IN THE STUDY OF FERROMANGANESE NODULE DEPOSITS, Michigan Univ., Ann Arbor. Dept. of Meteorology and Oceanography. For primary bibliographic entry see Field 02H. W73-02513

A SOURCE STUDY OF THE SUSPENDED SOLIDS IN THE GALLATIN RIVER, Montana State Univ., Bozeman. For primary bibliographic entry see Field 05B. W73-02559

INVESTIGATION OF SLOPE FAILURES IN

THE IDAMO BATHOLITH,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
M. J. Gonsior, and R. B. Gardner.
U S For Serv Res Pap Int. 97. p 2-34. 1971. Illus.

Maps.

Identifiers: *Erosion, *Idaho batholith, *Land-slides, Precipitation (Atmospheric), Tests, *Slope

Precipitation events in the winter and spring of 1965 caused significant erosion and numerous landslides in many parts of the Idaho Batholith. Most slope failures were associated with roads. An investigation of several representative failures in the Zena Creek sale area on the Payette National the Zena Creek sate area on the Payette National Forest was conducted. Details of the field and laboratory tests are given, and 3 examples of the stability analyses are presented. Causes of the failures are discussed, and recommendations for future construction in similar terrain are made.—Copyright 1972, Biological Abstracts, Inc. W73-02564

2K. Chemical Processes

DETERMINATION OF TRACE METAL POLLU-TANTS IN WATER RESOURCES AND SEDI-MENTS, Ohio State Univ., Columbus. Water Resources Center.

For primary bibliographic entry see Field 05A. W73-01958

PHYSICAL CHEMISTRY OF EXTRACTION PROCESSES, Institute of Nuclear Research, Warsaw (Poland). Por primary bibliographic entry see Field 01B. W73-02014

Dec

AUTOMATED SEPARATIONS IN ROUTINE ACTIVATION ANALYSIS OF MERCURY, Interuniversitair Reactor Instituut, Delft (Netherlands) ary bibliographic entry see Field 05A. For primar W73-02015

CHEMICAL ANALYSES OF WATER FROM WELLS IN HARRIS COUNTY, TEXAS, 1922-71, R. K. Gabrysch, W. L. Naftel, and G. D. McAdoo. Geological Survey, Austin, Tex. R. K. Gabrysch, W. L. Naftel, and G. D. McAdoo. Geological Survey Texas District Open-file Re-port, 1972. 88 p., 1 fig. 5 ref.

Descriptors: "Water quality, "Chemical analysis, "Water wells, "Well data, "Texas, Data collections, Aquifers, Groundwater, Depth. Identifiers: *Harris County (Tex).

Chemical analyses of water from 737 wells in Har-Chemical analyses of water from 737 wells in Harris County, Texas, for the period 1922-71 are reported. In addition to the chemical analyses, the tables include the well number, well owner, well depth or producing interval, water bearing unit, and date of sample collection. (Woodard-USGS) W73-02038

WATER RESOURCES DATA FOR COLORADO, 1971: PART 2. WATER QUALITY RECORDS. Geological Survey, Lakewood, Colo.

Geological Survey Basic Data Report, 1972. 72 p, 1

Descriptors: *Water quality, *Surface waters, *Basic data collections, *Colorado, *Chemical analysis, Sampling, Sediment transport, Streams, Sediment load, Particle size, Bottom sediments, Water temperature, Streamflow, Discharge mea-

Water quality data for surface water samples col-lected by the U.S. Geological Survey in Colorado during the 1971 water year are presented. Data for a few water-quality stations in bordering States also are included. The chemical quality includes concentrations of individual dissolved constituents and certain properties or characteristics such as hardness, sodium-adsorption-ratio, specific conductance, and pH. Fluvial sediment information is given for suspended-sediment discharges and concentrations, and for particle size distribution of suspended sediment and bed material. Water temperature data represent once-distribution for suspended sediment and bed material. material. Water temperature data represent once-daily observations except for stations with con-tinuous temperature recorders. Daily maximum and minimum temperatures are shown for these sites. (Woodard-USGS) W73-02039

DIRECT OBSERVATIONS OF COLUMNAR SCATTERING ASSOCIATED WITH GEOTHER-

Chemical Processes—Group 2K

MAL GAS BUBBLING IN THE BAY OF PLEN-

TY, NEW ZEALAND, Department of Scientific and Industrial Research, Wellington, New Zealand. Oceanographic Inst. For primary bibliographic entry see Field 02L. W73-02052

GEOCHEMISTRY OF GROUND WATERS FROM BURG EL-ARAB AREA, EGYPT, Frankfurt Univ. (West Germany). Institute of Petrology, Geochemistry and Stratification. E. E. El-Hinnawi, and S. M. Abdel-Moghee Neues Jahrbuch fur Geologie und Palaontologie Abhandlungen, Vol 140, No 2, p 185-206, April 1972. 8 fig, 1 tab, 17 ref.

Descriptors: "Geochemistry, "Water chemistry, "Groundwater, Mineralogy, Sulfates, Chlorides, Carbonates, Calcium, Salinity, Leaching, Water quality, Water balance, Arid lands, Alkalinity, Hydrogeology.

Identifiers: "Burg El-Arab (Egypt), "Egypt.

A detailed study was made of the geochemistry of groundwaters found in Burg El-Arab area, along the Mediterranean coastal plain of Egypt. The sur-face formations consist mainly of Quaternary deposits including beach deposits, drift san lacustrine and marshy deposits, downwash material, and carbonate rocks with intercalated evaporites. The main aquifer in Burg El-Arab is the oolitic limestone. Intercalations of gypsum are abundant in the West, while in the East deltaic deposits are common. The groundwaters show a considerable increase both in calcium and sulphate ons toward the west, caused by increase in the abundance of gypsum formations. Sodium, potassium and chloride ions increase toward the north, toward the sea. Carbonates and bicarbonates increase toward the east. The waters in the western parts of Burg El-Arab are comparable in their salt assemblage to sea water, while those in the eastern parts approach in character river water. According nity, the waters are classified as brackis and saline in the western part and brackish to fresh in the east. Chemically, the waters belong mainly to the sodium chloride and calcium sulphate types. (Knapp-USGS) W73-02053

COMPUTING SALINITY PROFILES IN ICE, Saskatchewan Research Council, Saskat For primary bibliographic entry see Field 02C. W73-02054

THE DETERMINATION OF TRACES OF CORALT AND OF NICKEL IN MINERAL WATERS, V. Nevoral.

Z Physiother. Vol 23, No 4, p 263-269, 1971. Identifiers: *Water analysis, *Cobalt, *Nickel, Analytical techniques.

The high affinity of the Chelon resin Dowex A-1 to bivalent ions of Co and Ni makes it possible to analyze mineral waters for their content of these trace elements. The ion exchange resin Dowex 1 x trace elements. The ion exchange resin Dowex 1 x
10 in Cl-form is used for the separation of the 2
ions by elution of Ni with 12 M HCl and of Co with
4.25 M HCl. The other cations interfering with the
final photometric determination with 4- (2pyridalazo) resorcine are masked with Chelation 3.
In the mineral water from the Ambrosius spring in Marienbad 4.15 microgram Co and 12.29 microgram Ni was found in 1 kg water by this method. Forty-five mineral waters from Bohemian and Moravian spas were thus tested. Co was found in quantities between 0.02 to 20 micro/kg, Ni in quan-tities between 0.1 and 370 micro/kg. The median ratio between Co and Ni was between 1:3 and 1:6.-Copyright 1972, Biological Abstracts, Inc. W73-02071

ADVANCES IN ANALYTICAL CHEMISTRY AND INSTRUMENTATION. VOLUME 9 - SPEC-TROCHEMICAL METHODS OF ANALYSIS. For primary bibliographic entry see Field 05A. W73-02096

HEAVY METAL ION INTERACTION AND TRANSPORT WITH SYNTHETIC COMPLEX-ING AGENTS AND DETERGENT PHOSPHATE SUBSTITUTES IN AQUATIC SYSTEMS, Missouri Water Resources Research Center, Rol-

For primary bibliographic entry see Field 05A. W73-02112

MOBILITIES OF INJECTED IONS IN LIQUID

WATER, Missouri Water Resources Research Center, Rol-For primary bibliographic entry see Field 05A. W73-02114

THERMAL, TURBIDITY, AND PH CONDITIONS OF THE UPPER WHITE RIVER: SIOUX AND DAWES COUNTIES, NEBRASKA, Arizona Univ., Tucson. Dept. of Anthropology. For primary bibliographic entry see Field 05C. W73-02151

NEUTRON ACTIVATION ANALYSIS OF WATER—A REVIEW, International Nutronics, Inc., Los Altos, Calif. For primary bibliographic entry see Field 05A. W71.02166

LABORATORY METHODS FOR THE MEA-SUREMENT OF POLLUTANTS IN WATER AND WASTE EFFLUENTS,

National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab. For primary bibliographic entry see Field 05A. W73-02167

CHEMICAL ANALYSES OF WATER FROM OBSERVATION WELLS IN THE EDWARDS AND ASSOCIATED LIMESTONES, SAN AN-TONIO AREA, TEXAS, 1967. Geological Survey, San Antonio, Tex.

Edwards Underground Water District Bulletin 16, January 1968, 9 p, 1 tab, 8 ref.

Descriptors: *Water quality, *Chemical analysis, *Groundwater, *Observation wells, *Texas, Groundwater movement, Limestones, Aquifers, Saline water intrusion, Water supply, Water analysis, Saline water-freshwater interfaces, Data collections, Sampling, Water wells.

Identifiers: "San Antonio area (Tex), Edwards

A program to resample observation wells tapping a zone of transition between water of good quality and saline water in the Edwards and associated limestones of the San Antonio area, Texas, was begun in 1959. The chemical analyses of the resampling program are being used to detect possi-ble encroachment of saline water into the fresh-water areas as the head in the aquifer changes are presented. Chemical analyses for 39 wells com-piled during 1967 are presented. Data for each well include well number, owner, depth of well, date of nample collection, and water temperature; chemi-sample collection, and water temperature; chemi-cal analyses include bicarbonate, sulfate, chloride, hardness, specific conductance, and pH. (Woodard-USGS) W73-02307

INDEX OF SURFACE WATER STATIONS IN TEXAS, OCTOBER 1972. Geological Survey, Austin, Tex.

For primary bibliographic entry see Field 07C. W73-02311

LOW-FLOW STUDY OF STREAMS IN ALBANY COUNTY, NEW YORK, Geological Survey, Albany, N.Y. For primary bibliographic entry see Field 07C. W73-02318

TIME STABILITY OF AQUEOUS APDC AND ITS MANGANESE AND NICKEL COMPLEXES IN MIBK, Geological Survey, Menlo Park, Calif. E. A. Jenne, and J. W. Ball. Atomic Absorption Newsletter, Vol 11, No 4, p 90.01 Ink. August 1972, 3 for 7 per

90-91, July-August 1972. 3 fig, 7 ref.

Descriptors: *Chemical analysis, *Trace elements, *Aqueous solutions, *Analytical techniques, *Spectroscopy, Ammonification, Nickel, Marganese, Chemical reactions, Water chemistry. Identifiers: *APDC/MIBK method, Ammonium pyrrolidine dithiocarbamate, Methyl isobutyl ketone.

The APDC/MIBK (ammonium pyrrolidine dithiocarbamate/methyl isobutyl ketone) system is presently being widely used for the complexation-extraction of trace metals from aqueous solutions. The absorbance of the Mn-APDC complex in MIBK is erratic and unstable. The initial pH of the complex and the helding tension of the complex in the complex and the helding tension of the complex and the helding tension of the complex in the aqueous phase and the holding temperature affect the time stability of the absorbance of this extract. the time stability of the absorbance of units extract. Since the addition of 20% acctone does not significantly depress the Mn-APDC/MIBK absorbance in spite of the dilution and markedly improves its time stability, the convenience, precision, and accuracy of Mn analysis of APDC-MIBK extracts by atomic absorption can be significantly improved by the addition of acetone to the separated MIBK extract immediately following phase separation. APDC may be purified with MIBK and kept under refrigeration for weeks when a sufficient excess of APDC is used to compensate for the slow decrease in chelation capacity. (Woodard-USGS) W73-02230

STRUCTURAL ASPECTS OF AMIDE-WATER SYSTEMS, Connecticut Univ., Storrs. For primary bibliographic entry see Field 05A. W73-02343

THE SYSLAB SYSTEM FOR DATA ANALYSIS INE SYSLAB SYSTEM FOR DATA ANALYSIS
OF HISTORICAL WATER-QUALITY RECORDS
(BASIC PROGRAMS),
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-02437

GEOPHYSICAL, GEOHYDROLOGICAL, AND GEOCHEMICAL RECONNAISSANCE OF THE GEOCHEMICAL RECONNAISSANCE OF LUKE SALT BODY, CENTRAL ARIZONA, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02F. W73-02480

HYDROCHEMICAL STUDY OF THE NATIONAL REACTOR TESTING STATION. OKAGI Geological Survey, Menlo Park, Calif. For primary bibliographic entry see Field 05B. W73-02484

RADIOMETRIC EVIDENCE FOR RECENT FORMATION OF PHOSPHATIC NODULES IN MARINE SHELF SEDIMENTS, Akademiya Nauk SSSR, Moscow. Institut Oke-anologii. For primary W73-02497 nary bibliographic entry see Field 02J.

Group 2K—Chemical Processes

THE EFFECTS OF DIVALENT METAL IONS ON THE MICELLAR PROPERTIES OF SODI-UM DODECYL SULFATE, Missouri Univ., Rolla. Dept. of Metallurgical En-

gineering. M. U. Oko, and R. L. Venable. Journal of Colloid and Interface Science, Vol 35, No 1, p 53-59, January 1971. 4 fig. 1 tab, 13 ref. OWRR B-017-MO (2). 14-01-001-1517.

Descriptors: *Surfactants, *Heavy metals, Lead, Copper, *Adsorption, Aqueous solution, *Airwater interfaces, Ions, *Electrolytes, *Ion exchange, *Nitrogen compounds, Zinc, Manganese. Identifiers: Micelles, Molecular weight.

Identifiers: Micelles, Molecular weight.

Critical micelle concentrations and micellar molecular weights have been determined for sodium dodecyl sulfate in the presence of nitrates of copper, lead, zinc, and magnesium and critical micelle concentrations have been determined with sodium nitrate and silver nitrate as the added electrolytes. The thickness of the ionic atmosphere at the critical micelle concentration has been found to be 34.1 A with no electrolyte present and 33.5 A with 9.66 x 10 to the minus 6th power M sodium or silver nitrate and was found to increase upon addition of the 2.1 electrolytes. This is explained in terms of molecular and ionic interactions. Micellar molecular weights were 14,200 in the absence of 4.83 x 10 to the minus 4th power M copper II, zinc, and magnesium, 18,000 with 4.83 x 19 to the minus 4th power M lead, and 25,000 with 9.66 x 10 to the minus 4th power M zinc. Part of the change in micellar molecular weight is attributed to replacement of sodium ions with heavier ions, especially in the case of lead.

W73-02557 W73-02557

THE CONTENT OF VARIOUS ELEMENTS IN

PRECIPITATION, Institut National de la Recherche Agronomique, Rouen (France). Station Agronomique.

A. Masclet, Christiane, Nagy, and S. Trocme.

Bull Assoc Fr Etud Sol. 2. p 3-8, 1971.

Identifiers: *France, Minerals, Nutrition, Plants, *Precipitation (Atmospheric), *Trace elements.

Measurements of the amounts of S, N (nitrate), Cl, C, Mg, K and Na in precipitation performed over extended periods of time at various locations in France indicate that the supply of assimilable N and of K by rain water is too insignificant to be of agricultural importance. Mg in rain water has its origin in the sea and while not negligible in quantity is not sufficient to meet crop requirements. The supply of Ca by rain water varies widely from 1 to 57 kg/ha for Western Europe and does not significantly affect the Ca balance in the soil. In contrast Cl is always supplied in adequate quantities by precipitation no matter what the distance from the sea. The supply of Na (1-30 kg/ha) is insignificant. The supply of S by precipitation has a marked effect on plant nutrition but it is in many instances hitherto unknown whether this effect is beneficial or detrimental.—Copyright 1972, Biological Abstracts, Inc. stracts, Inc. W73-02588

2L. Estuaries

CHEMICAL RESPONSES BY MARINE ORGAN-ISMS TO STRESS, STRESS IN HARD CLAMS FROM A POLLUTED ESTUARY, Rhode Island Univ., Kingston. Graduate School of

Oceanography.

For primary bibliographic entry see Field 05C.

W73-01975

OPTICAL SIGNATURES OF THE NEAR-SHORE WATERS OF SOUTHERN MONTEREY BAY, Naval Postgraduate School, Monterey, Calif.

For primary bibliographic entry see Field 05A. W73-02027

ECOLOGICAL EFFECTS OF OFFSHORE CON-

STRUCTION, Marine Science Inst., Bayou La Batre, Ala. For primary bibliographic entry see Field 05C. W73-02029

THE EVOLUTION OF COASTAL SAND DUNES, Aberdeen Univ. (Scotland). Dept. of Geograph For primary bibliographic entry see Field 02J. W73-02035

DESCRIPTION OF ALABAMA ESTUARINE AREAS—COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY, Alabama Marine Resources Lab., Dauphin Island.

J. H. Crance.

Available from the National Technical Informa-tion Service as COM-72-10283, \$3.00 in paper copy, \$0.95 in microfiche. Alabama Marine Resources Bulletin, No 6, August 1971. 85 p, 33 fig, 28 tab, 91 ref, 2 append.

Descriptors: *Estuaries, *Alabama, *Estuarine environment, *Water pollution effects, *Gulf of Mexico Review, Hydrologic data, Rainfall, Streamflow, Flow rates, Runoff, Tidal effects, Estuarine fisheries, Tidal marshes, Bays, Salinity, Aquatic habitats, Water temperature, Navigation, Channels, Water pollution sources, Industrial wastes, Municipal wastes, Spoil banks, Environmental effects.

The physical characteristics of Alabama estuarine areas are presented as part of a cooperative Gulf of Mexico estuarine inventory. The importance of estuaries as nursery areas for marine species and for other uses is discussed and the early history of the exploration and development of the Gulf of Mexico and the coastal area of Alabama is reviewed. The Alabama estuarine study area has 397,353 acres of open water, a volume of 3,833,489 acre-feet at mean high water, 34,614 acres of tidal marsh, 433 miles of bay and open water shoreline, 306.8 miles of streams, 3,064 acres of natural oyster reefs, approximately 224 acres of leased oyster bottoms and 1,050 acres of riparian bottoms used to grow oysters. In July 1970, there were 23 sources of municipal wastes and 31 sources of industrial waste that discharged a minimum total of 827.3 million gallons of effluents daily into the estuaries and nearby contributory streams. The effluents had a total estimated population equivalent of 634,190. There were 73,584 acres of estuarine water permanently closed to the harvest of shellfish, 143 miles of navigation channels, and 2,152 acres of emergent spoil banks and other filled areas in the estuaries in 1970. (Woodard-USGS) W73-02037 The physical characteristics of Alabama estuarine

HYDROMETEOROLOGICAL RELATIONSHIPS AND THEIR EFFECTS ON THE LEVEES OF A SMALL ARCTIC DELTA,
Louisiana State Univ., Baton Rouge. Coastal Stu-

dies Inst. For primary bibliographic entry see Field 08D. W73-02041

DIRECT OBSERVATIONS OF COLUMNAR SCATTERING ASSOCIATED WITH GEOTHER-MAL GAS BUBBLING IN THE BAY OF PLENTY, NEW ZEALAND, Department of Scientific and Industrial Research, Wellington, New Zealand. Oceanographic Inst. G. P. Glasby.
New Zealand Journal of Marine and Freshwater Research, Vol 5, No 3-4, p 483-496, December 1971. 3 fig, 4 tab, 27 ref.

Descriptors: *Thermal springs, *Geothermal studies, *Water chemistry, *Bubbles, Thermal water,

Chlorides, Sulfates, Structural geology, Faults (Geologic), Sounding.
Identifiers: *New Zealand, *Bay of Plenty (N.Z.).

TIDA

STRU Utrec tology J. F. I Geold May-

Descr *Tide Tidal Mud i

areas. Identi

Sever betwee and b tidal

ments reach lands lower cessis dune-West

Creta Engla sanda tidal

comp Eire. tidal

strati large poor fining strati

curre and/e lamir

(Kns

NAT INVI REG

Corr Div.

King For W73

ELE

EST HET For W73

AN ING Geo For W7:

HA'
TIO
Cor
Oce
For
W7

ZO N.J. Let and

Submarine geothermal activity in the Bay of Plenty, New Zealand, is a permanent feature characterized by the occurrence of columnar scattering on 12-38.5 kHz echo soundings and the visual sighting of gas bubbles at the sea surface. In the case of the bubble zone to the south of Whale Island, geothermal activity is associated with a well-defined fault zone and the geothermal waters are acid-sulphate rich. The thermal waters have anegligible influence on the salinity and temperature characteristics of the overlying bottom waters. (Knapp-USGS)

AND **PRODUCTION** MACROBENTHOS IN THE DEEPER PARTS OF KIEL BAY IN 1968, Kiel Univ. (West Germany). Institut fuer

Meereskunde W. E. Arntz.

Kiel Meeresforsch. Vol 27, No 1, p 36-72, 1971. Illus. Maps. Identifiers: fiers: Abra-Alba, Bays, *Benthos, nass, Demersal, Fish, *Germany, *Kiel Bay,

A quantitative study of macrobenthos in the deeper parts of Kiel Bay was conducted every 2 mo. in 1968 to get a picture of the food available for demersal fish. The share of fish food in the total benthos, the amount of food animals in important trawling localities, and seasonal and diurnal changes in the food offer are particularly discussed. After a comparison of biomass and production of different benthos species, the minimum production of macrobenthos in the Abra-alba coenosis of Kiel Bay is fixed by estimate.—Copyright 1972, Biological Abstracts, Inc. W73-02094

THE CORPS OF ENGINEERS CHESAPEAKE BAY STUDY.

Army Engineer District, Baltimore, Md.
L. W. Prentiss, Jr.
Journal of the Washington Academy of Sciences, Vol 62, No 2, p 190-195, June 1972.

Descriptors: *Chesapeake Bay, *Hydraulic models, Water resources development, Environmental effects, Social aspects, Estuaries, Hydraulics, Maryland, Research and development, Water management (Applied), Land management, Economics. Identifiers: Army Corps of Engineers.

The Corps of Engineers Chesapeake Bay Study is a comprehensive estuarine study encompassing engineering and the physical, biological, and social sciences. The primary output will be a water-land management program which will include urgently needed programs, a mechanism for evaluating proposed actions, and identification of the institutional arrangement that appears most desirable for management of the Chesapeake Bay's water and associated land resources. The primary tool in the development of the management program will be a development of the management program will be a hydraulic model of the Chesapeake Bay which will provide a means of reproducing some of the physi-cal phenomena that occur throughout this large and complex system as a result of various struc-tural and management alternatives. (Knapp-USGS) W73-02149

PHYSICAL-CHEMICAL CRISIS INDICATORS-

ARE THERE ANY,
Naval Academy, Annapolis, Md. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 05A.
W73-02150

TIDAL DEPOSITS AND THEIR SEDIMENTARY

STRUCTURES, Utrecht Rijksuniversiteit (Netherlands). Sedime

tology Div. J. F. M. de Raaf, and J. R. Boersma. Geologie en Mijnbouw, Vol 50, No 3, p 479-504, May-June 1971. 7 fig, 53 ref.

Descriptors: *Bottom sediments, *Sedimentology, *Tides, Estuaries, Stratigraphy, Sedimentation, Tidal waters, Tidal marshes, Deltas, Beaches, Mud flats, Tidal streams, Shallow water, Intertidal areas. Identifiers: *Tidal sedimentation.

Several examples of tidal sedimentation ranging between modern and Devonian age are illustrated and briefly discussed. They cover modern inter-tidal and subtidal and ancient tidal subenviron-ments. The cases discussed are: the estuarine tidal and subtidal and ancient tidal subenvironments. The cases discussed are: the estuarine reach of Barendrecht excavation, The Netherlands; Haringvliet excavation, The Netherlands; Haringvliet excavation, The Netherlands; Haringvliet excavation, The Netherlands; Haringvliet excavation, The Netherlands; Cession, Hattem (Veluwe), The Netherlands; dune-bearing estuarine sand-bank, modern Western Scheldt, The Netherlands; the Lower Cretaceous Woburn sands 50 km NW of London, England; the Oligocene Kerkom- and Neerrepen sands, Brussels, Belgium; and an Upper Devonian tidal succession belonging to the transgressive complex (Cork beds) overlying the Old Red, Cork, Eine. The following features are diagnostic for tidal deposits: (a) vectorial bimodality of the crosstratification; (b) common joint occurrence of targe-scale and small-scale structures; (c) usually poorly developed stratification with occasional ining-upward sequences; (d) unidrectional crossstratified sets displaying features resulting from the intermittent and bidirectional character of the currents; (e) fairly common occurrence of flaser-and/or lenticular bedding with mud-sand interlaminations; and (f) slight to intense bioturbation. (Knapp-USGS) (Knapp-USGS) W73-02154

NATIONAL SHORELINE STUDY, REGIONAL INVENTORY REPORT, NORTH ATLANTIC

Corps of Engineers, New York. North Atlantic Div.

For primary bibliographic entry see Field 08B. W73-02186

PAVE THE WETLANDS OR LET THEM BE, Kingswood School, West Hartford, Conn. For primary bibliographic entry see Field 06E. W73-02252

OF THE FUNDULUS ELEMENTAL COMPOSITION ESTUARINE TELEOST FUNDULUS
HETEROCLITUS (L.),
National Marine Water Quality Lab., West Kingston, R. I. For primary bibliographic entry see Field 05C. W73-02278

AN AUTOMATED SYSTEM FOR DETERMIN-ING ESTUARINE BATHYMETRY, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07B. W73-02317

HAWAII REGIONAL INVENTORY OF THE NA-TIONAL SHORELINE STUDY. Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Engineer Div. For primary bibliographic entry see Field 08B. W73-02321

ZOOPLANKTON OF THE SANDY BAY AREA, N.J., Lehigh Univ., Bethlehem, Pa. Center for Marine and Environmental Studies. For primary bibliographic entry see Field 05C. W73-02448

PROCEEDINGS 1971 TECHNICAL CON-FERENCE ON ESTUARIES OF THE PACIFIC Oregon State Univ., Corvallis. Engineering Experiment Station.

periment Station.
For primary bibliographic entry see Field 05C.
W73-02454

THE POTENTIAL OF PHYSICAL MODELS TO INVESTIGATE ESTUARINE WATER QUALITY PROBLEMS, Army Engineer Waterways Experiment Station, Vicksburg, Miss. For primary bibliographic entry see Field 05C. W73-02455

APPLICATIONS OF SOME NUMERICAL MODELS TO PACIFIC NORTHWEST ESTUA-

MODELS TO PACIFIC NORTHWEST ESTU RIES, Pacific Northwest Water Lab., Corvallis, Oreg. For primary bibliographic entry see Field 05C. W73-02456

MATHEMATICAL MODELING OF ESTUARINE BENTHAL SYSTEMS, Oregon State Univ., Corvallis. Dept. of Civil Eneering. For primary bibliographic entry see Field 05C.

LEGAL PROTECTION OF THE PACIFIC NORTHWEST ESTUARIES, Environmental Protection Agency, Portland, Oreg. Water Quality Office.
For primary bibliographic entry see Field 05C.

A STUDY OF SEDIMENTS FROM BEI LINGHAM HARBOR AS RELATED TO MARINE DISPOSAL, International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Cultus Lake

For primary bibliographic entry see Field 05C. W73-02461

HYDRO-ECOLOGICAL PROBLEMS OF MARINAS IN PUGET SOUND, Washington Univ., Seattle. Dept of Civil En-For primary bibliographic entry see Field 05C. W73-02462

HISTORICAL CHANGES OF ESTUARINE TOPOGRAPHY WITH QUESTION OF FUTURE MANAGEMENT POLICIES, Oregon State Univ., Corvallis. Dept. of Oceanog-

raphy.
For primary bibliographic entry see Field 05C.
W73-02464

EFFECTS OF INSTITUTIONAL CONSTRAINTS AND RESOURCES PLANNING ON GROWTH IN AND NEAR ESTUARIES, Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs. For primary bibliographic entry see Field 05C. W73-02465

RECENT FEDERAL POLICIES AFFECTING MARINE SCIENCE AND ENGINEERING MARINE SCIEN DEVELOPMENT.

National Council on Marine Resources and En-gineering Development, Washington, D.C. For primary bibliographic entry see Field 05C. W73-02466

CHARACTERISTICS OF ESTUARINE SEDI-MENTS OF THE UNITED STATES,

MENTS OF THE UNITED STATES, Geological Survey, Washington, D.C. D. W. Folger. Available from GPO, Washington, D.C. 20402, Price \$1.25 (paper cover). Geological Survey Professional Paper 742, 1972. 94 p. 139 fig, 2 tab,

Descriptors: "Sediments, "Estuarine environment, "Coasts, "United States, "Sedimentology, Tidal effects, Bottom sediments, Surveys, Reviews, Clays, Sands, Chemical properties, Pollutants, Bathymetry, Sedimentary structures, Particle size, Organic compounds, Carbon, Calcium carbonate, Maps, Geology, Hydrology. Identifiers: "Bstuarine sediments, "Sediment characteristics, Sediment texture.

The texture and composition of bottom sediments in the estuarine zones of the United States are a function of the geologic, bathymetric, and hydrologic settings in which they were deposited. Most bottom sediments that accumulate in the estuarine zone consist of terrigenous detritus, biogenic debris, and pollutants. Organic carbon generally makes up less than 5 percent of the bottom sediments except in swampy areas, fjords, or where pollutants are abundant. Inorganic constituents are mostly nearly felderar and clays where pollutants are abundant. Inorganic constituents are mostly quartz, feldspar, and clay minerals. In general, illite and chlorite are the most abundant clay minerals on the northeast coast; kaolinite predominates on the southeast Atlantic coast and in the eastern Gulf of Mexico; and montmorillonite is common along the coasts of the western Gulf of Mexico and the Pacific Ocean. Shell debris is locally abundant in many areas but is dominant only in areas far from terrigenous sources. (Woodard-USGS)

HYDRAULIC PARAMETERS CONTROLLING BEDFORM MIGRATION ON AN INTERTIDAL

BEDFORM MIGRATION ON AN INTERTIDAL SAND BODY, Illinois Univ., Urbana. Dept. of Geology. G. deV. Klein, and M. L. Whaley. Geological Society of America Bulletin, Vol 83, No 11, p 3465-3470, November 1972. 5 fig, 3 tab, 12 ref. NSF Grant GA-21141.

Descriptors: "Sediment transport, "Ripple marks, "Intertidal areas, Sands, Beaches, Sedimentary structures, Sand waves, Dunes, Bed load, Move-ment, Currents (Water), Littoral drift, Waves (Water), Surf, Particle size. Identifiers: *Bay of Fundy.

Bedform migration on an intertidal sand body in the Minas Basin, Bay of Fundy, is controlled by time-velocity asymmetry of tidal currents and by water depth. Dune migration occurs during ebb tide, whereas sand wave migration occurs during flood tide. Bedform migration is limited to short periods ranging from 40 min to 1.5 hrs, which coincide with maximum velocity phases of time-velocity profiles. Normal bottom-current velocities are achieved rapidly after sand body submergence and high water stage. Initiation of bedform migration occurs during both a subsequent decrease in bottom-current velocity and a later sharp increase to maximum bottom-current velocity and a later decrease in bottom-current velocity and a later sharp increase to maximum bottom-current velocities. Dune migration takes place in water depths greater than those required for sand wave migration. This contrasts with water depth relations predicted from empirical formulae relating bedform wave length and wave height to depth of fluid flow. Representation of intertidal bedform migration variables on a depth-velocity-particle-size diaroms shows excellent agreement with similar data obtained from experimental studies. (Knapp-USGS) USGS) W73-02489

QUANTITATIVE FLUCTUATIONS IN THE ZOOPLANKTON OF THE BAIE-DE-ZOOPLANKTON OF THE BAIE-DE-S-CHALEURS (SAINT-LAWRENCE GULF): III.

Group 2L—Estuaries

FLUCTUATIONS IN COPEPODS OTHER THAN

CALANUS, Laval Univ., Quebec. Departement de Biologie. G. Lacroix, and G. Filteau. Nat Can. Vol 98, No 5. p 775-813. 1971. Illus.

Maps. English summary. Identifiers: Acartia clausi, *Baie des chaleurs, Identitiers: Acartia clausi, "Baie des Caaleurs, Calanus, Dyperboreus, Canada, Centropages hamatus, "Copepods, Euchaeta norvegica, Eurytemora herdmani, Fluctuations (Fish), Gulf, Metridia longa, Oithona similis, Plankton, "St. Lawrence Gulf, Temora longicornis, Tortanus discaudatus, "Zooplankton.

nis, Tortanus discaudatus, *Zooplankton.

Among the 13 Copepoda spp, particularly abundant and frequent in the Baie des Chaleurs area from 1960 to 1962, 8 reached density peaks in 1962, versus 3 in 1961 and 2 in 1960. In the latter year 5 other spp. exhibited a rather high density level. Six of the 8 spp, showing maximum density in 1962 are boreal species, typical in surface waters (Temora longicornis, Tortanus discaudatus, Centropages hamatus, Eurytemora herdmani, Acartia clausi, Oithona similis) and generally predominant inside the bay. This situation reflects accurately hydroclimatic conditions in 1962, especially notable for the greater homogeneousness demonstrated by physical properties and the greater thickness of surface layer above the thermocline. All 3 maximum density species of 1961 are either arctic or subarctic speces typical of the cold layer and occurring in waters outside the bay (Metridia longa, Calanus hyperboreus, Euchaeta norvegica). This finding is consistent with the main 1961 characteristic, namely the persistence of negative temperatures in summer within the cold layer, brought about by a brief hydrographic summer period and less intensive mixing of water than in 1962. Comparatively summer within the cold layer, brought about by a brief hydrographic summer period and less intensive mixing of water than in 1962. Comparatively to 1961 and 1962, hydroclimatic conditions in 1960 were much less sharp, and also less simple due to the thermal heterogeneity of waters in the area, thus permitting a rather undifferentiated proliferation of various boreal, subarctic and arctic species.—Copyright 1972, Biological Abstracts, Inc. W73-02570

THE GASPE COD ECOSYSTEM IN THE GULF OF ST. LAWRENCE: II, WEEKLY FLUCTUA-TIONS OF COMMERCIAL TRAWL CATCHES OF COD WITH DEPTH AND TEMPERATURE IN 1960-1962, Montreal Univ. (Quebec). Dept. of Biological

P. Brunel.
Nat Can. Vol 98, No 5, p 815-835, 1971. Illus.
Identifiers: *Canada, *Cod, Commercial trawl,
Ecosystem, Fluctuations, *Gaspe cod, *Gulf, St.
Lawrence, Temperature.

The local bathymetric distribution of commercial trawl catches of cod in 1960-62 is studied, from log trawic catenes of cod in 1900-02 is studied, from log records of New Brunswick otter-trawlers, in its seasonal fluctuations as an index of seasonal verti-cal migrations of the stock in the Gulf of St. Lawrence, unforeseen deviations from this known model, distribution of the fish in bottom-indepenmodel, distribution of the fish in bottom-independent pelagic layers, known elsewhere from sonar. Demersal cod in late spring-early summer were on the banks in 1960, mainly above the sub-thermocline cold layer, and in 1962 they were also at even smaller depths. In 1961, however, they were decidedly in the lower part of the cold layer. In late summer-fall, they distributed evenly with depth and temperature in 1960, went to smaller depths. and temperatures in 1960, went to smaller depths above or in the upper part of the cold layer in 1961, and retained their late spring distribution in 1962, and retained their late spring distribution in 1962, following July upwelling and surface cooling. Catches in very shallow water in July 1962 were remarkably high. There are indications of more variable catches in late spring than in late summer. Temperature in the form of a strong gradient such as the thermocline is certainly an important limiting factor of cod bathymetric distribution on the bottom in summer and fall, and probably also in midwater, despite more limited direct evidence. But a more common temperature effect is cod association with 0-6 degree C water, bathymetrically related or not to the thermocline. Temperatures outside this range appear limiting to both daily and seasonal vertical migrations. There are clues that the known demersal dimension of the latter may be applied also to the pelagic component. The vertical distribution of commercial cod catches in the Gaspe fishing banks area from 1952 to 1962 can be explained in terms of temperatures only on broad seasonal and geographic scales. Other factors are clearly required on the smaller scales of the order of 1-2 mo. or of 20-30 km, especially to explain cod concentrations before 15 July in the cold layer in 1961 and at depths (38-73 m) smaller in 1962 than in 1960.—Copyright 1972, Biological Abstracts,Inc. W73-02581

COMPARATIVE STUDY OF THE ECOLOGY OF FREE-LIVING CILIATES IN THE RU-GOZERSKY INLET (KANDALAKSHA BAY, WHITE SEA), Moscow State Univ. (USSR). Dept of Invertebrate

Zoology. For primary bibliographic entry see Field 05C.

W73-02585

THE HYDROLOGICAL CONDITIONS FOR THE ENTRY OF SAGITTA ENFLATA INTO OSAKA BAY: II. IN THE CASE OF A PEARANCE OF A COLD WATER MASS (IN

PEARANCE OF A COLD WATER MASS (IN JAPANESE),
Hyogo Prefecture Fisheries Experiment Station, Akashi (Japan).
T. Hamada, S. Iwai, and H. Moriwaki.
Bull Jap Soc Sci Fish. Vol 37, No 5, p 357-363, 1971. Illus. Maps. English summary.
Identifiers: Bays, *Cold water mass, *Osaka Bay (Japan), *Sagitta enflata, Hydrological conditions.

In the summer of 1969 (July-Sept.) an unexpectedly cold water mass, 3-7C appeared in the intermediate and bottom layers (10-50 m layers) from the southern part of the Osaka Bay to the northern part of the Kii suido (channel) and developed most extensively in Aug. Although this summer period corresponds to the time when S. enflata move into corresponds to the time when S. enflata move into Osaka Bay and is used as an index to note the entry of the Kuroshio system water mass in the said waters, the number of S. enflata in the Osaka Bay in the same period was small. The distribution of S. enflata at that time was narrow and discontinuous. Also, the number of S. enflata in Osaka Bay between Sept. and Dec. 1969 was smallest as compared with corresponding data for the 1965-1968 period, suggesting that the hydrological con-ditions were unfavorable for the entrance of S. enflata due to the cold water mass and therefore disturbed immigration of the species from the open sea.—Copyright 1972, Biological Abstracts, W73-02587

QUANTITATIVE DESCRIPTION OF THE INITIAL LINKS OF THE PRODUCTION PROCESS IN THE SHALLOW-WATER BAYS OF THE POSIET BAU (JAPANSES SEA), (IN RUSSIAN), Akademiya Nauk SSSR, Vladivostok. Institut Morskogo Biologii. For primary bibliographic entry see Field 05C. W73-02597 QUANTITATIVE DESCRIPTION OF THE INI-

THE PRINCIPLE OF DISPERSAL OF THE SUB-TERRANEAN PSAMMON AT THE TRANSI-TION BETWEEN SEAWATER AND FRESH-

WATER, P. Ax, and R. Ax. Akad Wiss Lit (Mainz) Math Naturwiss KI Mikrofauna Meeresbodens. 1. p 5-52. 1970. Illus.

Identifiers: *Dispersal (Fauna), Fauna, *Psammon (Subterranean), Transition water, *Gulf of Fin-

The principle of dispersal of the subterranean sandy microfauna established in the marine en-vironment was studied for a brackish-water beach at the Gulf of Finland. From marine to limnetic vironment was studied for a brackish-water beach at the Gulf of Finland. From marine to limnetic conditions the damp sand zone covers the specific biotope of the subterranean mesoposammon. Towards the groundwater level a rapid decrease of population density generally can be observed. A large number of classical 'stygobionst' of different ecological origin are included. Marine species as well as brackish-water organisms and animals of limnetic origin are localized exclusively in the damp sand zone. Dynamics of the subterranean microfauna is related to the water-line and to the ground-level. Depending on aperiodical fluctuations of the water level, the mesoposammon intensively migrates in horizontal and vertical parison was made with the Edogaeolimnon of lakes and rivers with general conclusions on subterranean ecology. There were no interstitial fauna below the ground-water level on the beaches of lakes and a few on marine beaches. Mesopsammon was not found in the ground-water on the river beaches. The importance of 02 for the vertical distribution of the microfauna is discussed.—Copyright 1972, Biological Abstracts, Inc. W73-02599

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

CONCENTRATION OF BRINES BY SPRAY

EVAPORATION,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 05E.
W73-02081

FURTHER STUDIES OF OPTIMUM OPERA-TION OF DESALTING PLANTS AS A SUPPLE-MENTAL SOURCE OF FIRM YIELD, Utah Water Research Lab., Logan. C. G. Clyde, and W. H. Blood. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price \$1.25. Office of Saline Water Research and Development Progress Report No 780, July 1972. 137 p. 25 fig. 15 tab, 4 ref, 4 ap-pend. PRWG-82-1. 14-30-2534.

Descriptors: "Water supply, "Desalting plants, Water yield, Conjunctive use, Water costs, Computer programs, Simulation analysis, "Desalination, "Optimum development plans. Identifiers: Optimal operating rule, New York City water supply, Norfolk (Va), Water supply, Norfolk (Va), Water supply, "Firm water yield, Optimal operation, Optimum

plant size.

The Operating Rule Program was developed in an earlier study to furnish a means to determine optimum desalting plant size, optimal operating rule, and costs of operating in conjunction with existing water supply systems. Under the present study, five further objectives were accomplished: (1) The program was applied to a New York City water supply system feasibility study in connection with a dual purpose nuclear power plant to develop costs for adding firm yield to the New York City water supply system in conjunctive operation with the desalting plant. (2) The program was modified to enable assessment of stage construction of desalting units when used in conjunction with a natural water supply system on the basis of both constant costs over the period of analysis and inflationary costs. Techniques were developed for applying the program to determine the optimal plant module size, timing of units, and costs of the water. (3) A separate, smaller program was developed to enable analysis of desalting plant operation in conjunction with a natural water

supply sy training page group des application gram. (5) ginia, wat applying t W73-0208

OPTIMU PURPOS PURPOS Econotecl F. Mobasi K. Willian For sale U.S. Gov D.C. 2040 Research 782, Nove pend. 14-3

Descripto Cost com supply, W analysis, I *Optimum Economic

An analyi

benefits to tion of a

tipurpose Mathemat mine the c for a syst paint and water res simulation technique branching TRAN la read-in of capacity a tricity con and firm developed capacity. use of su based on o An increm developed lations. T determine of a hypo stract) W73-02083

STUDIES DRINKING STATE OF Ministerst For primar W73-02091

WATER TURE, Stanford L R. Eliasser Journal of tion, Vol 6

> Descriptor processes, Electrodia costs, Sea Identifiers

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 03

Conservation in Domestic and Municipal Use—Group 3D

supply system having no storage capacity. (4) A training program provided instruction to a selected group designated by OSW on the detailed use and application of the Modified Operating Rule Program. (5) A feasibility study of the Norfolk Virginia, water supply system was also carried out by applying the modified program. (OSW abstract) W73-02082

OPTIMUM CONJUNCTIVE USE OF A DUAL-PURPOSE DESALTING PLANT AND MULTI-PURPOSE SURFACE WATER RESERVOIRS, Econotech Systems, Inc., Los Angeles, Calif. F. Mobasheri, V. S. Budhraja, R. C. Harboe, and

K Williams

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price \$1.25. Office of Saline Water Research and Development Progress Report No 782, November 1971, 135 p, 16 fig, 39 tab, 4 append. 14-30-2614.

Descriptors: *Desalination, Desalination plants, Cost comparisons, Costs, Water costs, *Water control comparisons, Costs, water costs, water supply, Water demand, Computer programs, Cost analysis, Mathematical studies, *Conjunctive use, *Optimum development plans, Water storage, Economics, Systems analysis, *Reservoir storage.

An analytical technique to assess the economic benefits to be derived from the conjunctive operation of a dual-purpose desalting plant with mul-tipurpose surface water reservoirs is described. Mathematical models were developed to determine the optimum long-term operation parameters for a system comprising a dual-purpose desalting paint and several existing multipurpose surface water reservoirs. The optimization models use simulation and incremental dynamic programming techniques. These models are developed for reservoirs built on the same river and for reservoirs on branching rivers. Computer programs using FOR-TRAN language were developed to solve the mathematical models. The logic used involved the read-in of input data, selection of a desalting capacity and calculation of firm water and electricity contract levels. A production possibility curve showing the tradeoff between firm water and firm electricity output levels was then developed for each specified level of desalting capacity. An economic model was developed to calculate the benefit and cost from the conjunctive use of surface reservoirs and desalting plants based on output data from the computer programs. An incremental firm water supply curve was then developed, based on these benefits and cost calculations. The models developed were applied to determine the optimum long-term operation mode of a hypothetical conjunctive system. (OSW abstract) W73-02083

STUDIES OF THE EFFECT OF DESALINATED DRINKING WATER ON THE FUNCTIONAL STATE OF THE ORGANISM,
Ministerstvo Zdravookhraneniya SSSR, Moscow.

For primary bibliographic entry see Field 05F.

WATER DESALTING, PRESENT AND FU-TURE, Stanford Univ., Palo Alto, Calif.

R. Eliassen.

Journal of the American Water Works Association, Vol 61, No 11, p 572-574, November 1969. 1 fig, 2 tab, 11 ref.

Descriptors: *Desalination, *Desalination Descriptors: "Desalmation, "Desalmation plants, Reverse osmosis, Electrodialysis, Distillation, Dual purpose, Water costs, Sea water, Treatment facilities. Identifiers: Bolsa Island (Calif).

Reverse osmosis, or desalting water by passing through a thin plastic membrane impermeable to dissolved solids, bacteria, and other particulates, through a thin plastic membrane impermeable to dissolved solids, bacteria, and other particulates, has become increasingly practical though reliability criteria and costs have yet to be determined. The electrodialysis method of desalting is in use at more than 100 installations worldwide. A proposed plant in Utah could desalt water from 2,500 to 500 mg/l for \$0.228/1,000 gal. with nuclear fuel and \$0.227/1,000 gal. with fossil fuel. Cost of distillation for desalting is continually decreasing. The largest distilling plant, near Tijuana, Mexico, is predicted to produce fresh water from the sea for \$0.80/1,000 gal. Among future plans is the proposed dual plant in Southern California, Boisa Island, which will produce 150 mgd of distilled water and have a power capacity of 180 mw. A joint United States-Mexico project for dual purpose desalting plants would have an electrical generating capacity of 2,000 mw and a fresh water capacity of 1,000 mgd at cost of between \$0.10 and \$0.301,000 gal. (Weir-AWWARF)

REMOVAL OF TOXIC PESTICIDES BY REVERSE OSMOSIS WATER TREATMENT, Massachusetts Univ., Amherst. Dept. of Civil En-

gineering. For primary bibliographic entry see Field 05D. W73-02222

3B. Water Yield Improvement

THE INFLUENCE OF THE NEW ENGLAND WETLAND ON WATER QUANTITY AND QUALITY, New Hampshire Univ., Durham, Water Resources

Research Center.
For primary bibliographic entry see Field 02D.
W73-02116

WATER FOR THE WEST, California State Dept. of Water Resources, Sacra-For primary bibliographic entry see Field 06D.

OPTIMIZING THE OPERATION OF ISRAEL'S

WATER SYSTEM, Technion - Israel Inst. of Tech., Haifa. Dept. of

Civil Engineering.
For primary bibliographic entry see Field 06B.
W73-02287

THE DEVELOPMENT OF ISRAEL'S WATER

RESOURCES, Tahal Consulting Engineers Ltd., Tel Aviv For primary bibliographic entry see Field 06B. W73-02292 (Israel).

YIELDS OF DEEP SANDSTONE WELLS IN ORTHERN ILLINOIS, Illinois State Water Survey, Urbana.

Illinois State Water Survey, Oroana.

W. C. Walton, and S. Csallany.
Illinois State Water Survey Report of Investigation 43, 1962. Second printing 1970, 47 p, 17 fig, 11

Descriptors: *Water wells, *Sandstones, *Illinois, *Aquifer characteristics, *Well data, Regional analysis, Deep wells, *Specific capacity, Geologic

Identifiers: Consolidated aquifers, Well Yield, *Well development, *Shooting (Blasting).

Most deep sandstone wells in Northern Illinois tap several bedrock aquifers and are multiunit wells. The average depth of these wells is about 1300 feet; recent wells are often 16 to 20 inches in

diameter. The yields of the 1) Galena-Platteville Dolomite and Glenwood-St. Peter Sandstone, 2) Prairie du Chien Series, Tempealeau Dolomite, and Franconia Formation, and 3) the Ironton-Galesville Sandstone constitute about 15, 35, and 50 percent, respectively, of the total yield of the rocks above the Mt. Simon sandstone. The average increase in yields of deep sandstone wells as the result of shooting was about 28 percent. (Campbell-NWWA) (Campbell-NWWA) W73-02386

DESIGN, EXECUTION, AND RESULTS OF A MESOSCALE SNOWSTORM MODIFICATION

PROJECT, National Oceanic and Atmospheric Administra-tion, Boulder, Colo. Atmospheric Physics and Chemistry Lab. For primary bibliographic entry see Field 02C. W73-02483

RESERVOIR YIELD IN ARID REGIONS WITH

LIMITED RECORDS, Lund (G. G. A.), Johannesburg (South Africa). For primary bibliographic entry see Field 02A. W73-02545

3C. Use of Water of Impaired **Ouality**

ON THE USE OF RECLAIMED WASTE-WATERS AS A PUBLIC WATER-SUPPLY SOURCE.

American Water Works Association, New York.

Journal of the American Water Works Association, Vol 63, No 10, p 609, October 1971.

Descriptors: *Water reuse, *Reclaimed water, Water sources, *Research priorities.

The American Water Works Association acknowledges the trend toward direct use of reclaimed wastewaters in industry and agriculture but cautions that further study is needed before these waters can be a source of public water supply. It recommends that such research identify possible contaminants, evaluate treatment, deterprocesses and equipment, and improve opera-tional personnel capabilities. (Weir-AWWARF)

3D. Conservation in Domestic and **Municipal Use**

INVENTORY OF WATER DIVERSIONS AND RATE STRUCTURES FOR CITIES, TOWNS, AND VILLAGES IN NEW MEXICO, New Mexico Agricultural Experiment Station, University Park. For primary bibliographic entry see Field 06C. W73-01963

(SANTA ROSA, SONOMA COUNTY, CALIFORNIA, SEWER COLLECTION AND WATER DISTRIBUTION SYSTEM), (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Economic Development Administration, Washington, D.C.

Available from the National Technical Informa-tion Service as PB-208 850D, \$3.00 in paper copy, \$0.95 in microfiche. May 3, 1972. 58 p, 6 map, 4

Descriptors: *Environmental effects, *California, *Sewers, Groundwater, Erosion, Water utilization, Vegetation, Wildlife, Urban runoff, Water delivery, Water distribution (Applied), Economic impact, Industrial water, Land use, Population.

Field 03—WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3D—Conservation in Domestic and Municipal Use

Identifiers: *Environmental Impact Statements, *Santa Rosa (California).

The city of Santa Rosa, located in Sonoma County, California, has been designated an economic redevelopment area largely as a result of a high area unemployment rate. A sewer collection line and water distribution line to serve a 200-acre in and water distribution line to serve a 20-acre in-dustrial site has been proposed. The proposed sewer extension is designed to serve a tributary area of 5,600 acres, and is part of a 15-year planned expansion of the city. Environmental im-pacts of the proposed action include land use changes, population density increase through ur-banization, and increased vehicular traffic. Adpanization, and increased venicular trails. Adverse environmental effects include an increase in air emissions resulting from commercial development, a relatively small degree of erosion during construction activities, and some deterioration of surface run-off potential caused by hillside construction activity. Alternatives to the proposed action include no action or basic changes in the planned development of residential, commercial, and industrial activities of the community. (Bradley-Florida) W73-01996

FURTHER STUDIES OF OPTIMUM OPERA-TION OF DESALTING PLANTS AS A SUPPLE-MENTAL SOURCE OF FIRM YUELL, Utah Water Research Lab., Logan. For primary bibliographic entry see Field 03A. W73-02082

THE CENSUS AND WATER UTILITIES, Bureau of the Census, Washington, D.C. Popula-For primary bibliographic entry see Field 06D W73-02136

BIG CREEK AND METRO ZOO FLOOD AND AESTHETIC IMPROVEMENT, CLEVELAND, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 04A. W73-02268

COST OF PUBLIC WATER SERVICE IN OHIO, Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology. For primary bibliographic entry see Field 06C.

REGIONAL MANAGEMENT OF WATER SUPPLY AND WASTEWATER DISPOSAL SUPPLY AND WASTEWATER DISPOSAL FACILITIES, North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 06B. W73-02354

PROPOSED EXPERIMENTAL PROGRAMS FOR TESTING REMOTE SENSOR APPLICA-TIONS IN THE METROPOLITAN WASHING-TON AREA.

Washington Council of Govern-For primary bibliographic entry see Field 07B. W73-02491

3E. Conservation in Industry

INVENTORY OF WATER DIVERSIONS AND RATE STRUCTURES FOR CITIES, TOWNS, AND VILLAGES IN NEW MEXICO, New Mexico Agricultural Experiment Station, University Park. For primary bibliographic entry see Field 06C. W73-01963

THE EFFECTS OF SEWER SURCHARGES ON THE LEVEL OF INDUSTRIAL WASTES AND THE USE OF WATER BY INDUSTRY, North Carolina Water Resources Research Inst., For primary bibliographic entry see Field 05G. W73-02115

WATER FOR INDUSTRIAL NEEDS: WHAT, WHERE, WHEN, Ford Motor Co., Detroit, Mich. Environmental Control Section. S. H. Vaughn. Journal of the American Water Works Association, Vol 63, No 3, p 142-147, March 1971. 7 fig.

Descriptors: Water users, *Industrial water, *Water reuse, Water supply, Water quality, Design data, Economics.

A community's water supply is important to development of industry, from a quality and quantity standpoint. Alternate or supplemental supplies often must be considered when designing industrial facilities. Additional supply may be required for fire protection. Additional treatment may be necessary to raise the quality to specific needs. More and more industries are turning to recycling wastewater or process water, to save on the cost of new water and effectively stretch the existing supply. Optimum solution of industrial water requirements is a complex interaction of many factors, but must consider at least quality and quantity requirements, quality and quantity of the source, additional equipment or supply necessary to fill the difference, if any, and what the economics of the various alternates dictate. (Ball-AWWARF)

GREAT LAKES ADDS NEW WOODROOM AND FLUID BED REACTOR,
For primary bibliographic entry see Field 05D. W73-02190

TOWARDS GREATER WATER RE-USE For primary bibliographic entry see Field 05D. W73-02286

RATE DESIGN AND COST OF SERVICE, Brown and Caldwell, Alhambra, Calif.
For primary bibliographic entry see Field 06C. W71,02298

THE EFFECT OF WATER RESOURCES ON IN-DUSTRIAL GROWTH IN THE TENNESSEE VALLEY REGION, Tennessee Univ., Knoxville. Center for Business and Economic Research. C. B. Garrison, and A. S. Paulson. Available from Center for Business and Economic Research. University of Tennessee. Knoxville.

Research, University of Tennessee, Knoxville, Tenn. Price: \$2.75. Research Report, July 1972. 85 p. OWRR A-015-Tenn (3).

Descriptors: *Industrial water, *Water resources, Labor supply, Industrial production, *Tennessee, Employment, *Water supply, Water utilization, Identifiers: Microlocation.

A significant microlocation relationship exists between water-oriented manufacturing employ-ment and water availability, where water availa-bility is measured in terms of 7-day, 10-year bility is measured in terms of 7-day, 10-year minimum streamflow, in the 194-county Tennessee Valley region. At the county level, chi square tests of independence indicate that concentrations of at least 500 employees in water-oriented manufacturing (and increases of at least 250 over the period 1959-1968) are significantly related to water availability. Further, the data and tests suggest that a streamflow in the neighborhood of 400 cfs

(cubic feet per second) is the critical or threshold flow necessary for the occurrence of such employ-ment concentrations. To explain the variation in memer concentrations. 10 explain the variation in employment per river mile among small regions within the region, a regression equation with popu-lation density as the independent variable was con-structed. The regression indicates that, for a dif-ference of 10% in population density between small regions, employment per river mile varies by 8 1566. W73-02562

3F. Conservation in Agriculture

INFLUENCE OF MIST IRRIGATION ON GROWTH, YIELDS, AND QUALITY OF POTATOES AND SNAP BEANS, Minnesota Univ., Minneapolis. Water Resources Research Center R. E. Nyhand, D. C. Sanders, and R. Schaefer. Available from the National Technical Informa-tion Service as PB-213 186, \$3.00 in paper copy, 80.95 in microfiche Completion Report. Nov. 1972. Minnesota Water Resources Research Center, St. Paul, 7 p, 7 ref. OWRR B-013-Minn (8)

Descriptors: "Mist irrigation, "Potato, "Moistures Stresses, Transpiration, Temperature, Soil moisture, Photosynthesis, Crop production, Plant growth, Foilage.
Identifiers: "Stomata, "Fugor, "Haulm, Senescence, Split plot design, Petioles, Petiolar.

14-01-0001-1915

The influence of irrigation method on potato growth and development was assessed during three years. Low volume 'mist' irrigation (M), fur-row irrigation (F), mist plus furrow (MF) and no irrow irrigation (IV), mass puls surrow (AIV) and no irrigation (NI) were compared. During a high and moderate stress season misting maintained the haulm later into the season and increased the proportion of small and medium size tubers. Further during the high stress season misted plots (M and MF) yielded more than NI plots, Misted canopies MF) yielded more than NI plots. Misted canopies had lower leaf, air and soil temperature and higher soil moisture than the non-irrigated plants. Stromata of misted plants did not close as rapidly as those of non-irrigated plants. Leaves from different irrigation methods did not differ consistently in levels of N, K, Mg, Ca or Fe. However, during the latter part of two seasons NI plants contained less P and K and more Fe than M or MF plants. F plants were similar to NI deats. plants contained less P and K and more Fe than M or MF plants. F plants were similar to NI plants in nutrient except that P was lower in the latter. Tubers from misted treatments (M and MF) tended to be lower in dry matter, had a high incidence of secondary growth and hollowheart, yielded darker chips, required more time to condition, were less mature, and contained more reducing sugars than those from NI treatments. Further the tubers from misted treatments tended to contain more P, Mg, Co. Ec. Al. Based M than these from NI and the set. Ca, Fe, Al, B and Mn, than those from NI plots at various times during the latter part of the season. (See W73-01967 thru W73-01969) (Walton-Minnesota) W73-01966

A STUDY OF THE EFFECTS OF MIST IRRIGA-TION ON THE POTATO (SOLANUM TU-BEROSUM L.) AND THE SNAP BEAN (PHASEOLUS VULGARIS L.), Mianesota Univ., St. Paul. Dept. of Horticultural

R. L. Schaefer. M.S. Thesis. 1972. 64 p, 6 fig, 17 tab, 116 ref. OWRR B-013-Minn (5). 14-01-0001-1915.

Descriptors: *Mist irrigation, *Potato, *Tubers, Snap beans, Haulm growth, Leaf temperatures. Identifiers: *Furrow irrigation, *Potato chips, Snap bean pods.

The influence of low-volume 'mist' irrigation during mid-day on potato and snap bean growth and

plans w 1971. M plus fu rigation loam so convent coarse in the was gre other 3 not diff vest, M greater Potatoe colored (MIST) that we haulm g grown u CONV siderabl potato yielded CONV. (See also W73-019

develop

and K. V p 243-25 Minn (6) Descript Dry mat Identifie *Chippin

THE IN THE P TORS,

Minneso Science. D. C. Sa

The influ factors volume nist plu compare MF) ten yielded tion, we ing suga tain mor from NI part of t Minneso W73-019

THE IN EVAPORTION OF Minneso Science. D. C. Sa HortScie 2 tab, 6 1915.

Descript Sugars, *Carbon Identifie

Potato p Cobbler) more 140 14C was

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 03

Conservation in Agriculture—Group 3F

development, and on the reduction of environmental water and temperature stresses in growing plans was studied during the summers of 1970 and 1971. Mist irrigation (MIST) was compared to mist plus furrow irrigation (MIST+FIRR), furrow irrigation (FIRR), and no irrigation (CONT) on a sit learn soil in 1970, and with miscinal (MITC) and rigation (FIRR), and no irrigation (CONT) on a sitt loam soil in 1970, and with minimal (BUDG) and conventional (CONV) sprinkler irrigation on a coarse sand soil in 1971. Misted potatoes (MIST and MIST+FIRR) had greater haulm growth early in the season. Mean marketable yield of tubers was greater under MIST+FIRR than under the other 3 treatments at final harvest, but yields did not differ at earlier sampling dates. At final har-vest, MIST, MIST+FIRR, and FIRR plots had a greater amount of laver potatoes than CONT. vest, MIST, MIST+FIRR, and FIRR plots had a greater amount of larger potatoes than CONT. Potatoes from MIST plots produced lighter colored chips than those from the other treatments. Potatoes and snap beans that were misted (MIST) had lower leaf temperatures than those that were not misted (BUDG and CONV). Potatoes grown under CONV had the greatest haulm growth at the early sampling date. Potatoes grown under MIST yielded as well as BUDG and CONV even though the former received considerably less water. MIST tubers yielded lighter potato chips than BUDG or CONV. Snap beans yielded as well under MIST as under BUDG or CONV. MIST delayed maturity of snap bean pods. (See also W73-01966) (Walton-Minnesota) W73-01967

THE INFLUENCE OF MIST IRRIGATION ON THE POTATO IV. TUBER QUALITY FAC-

Minnesota Univ., St. Paul. Dept. of Horticultural

D. C. Sanders, R. E. Nylund, E. C. Quisumbing, D. C. Sanders, R. F. Nyland, E. C. Quisumoing, and K. V. P. Shetty. American Potato Journal, July 1972, Vol 49, No 7, p 243-254. 12 p, 4 fig. 3 tab, 18 ref. OWRR B-013-Minn (6). 01-0001-1915.

Descriptors: *Mist irrigation, *Potato, *Tubers, Dry matter, Nutrient, Sugar content.
Identifiers: *Split plot design, *Senescence, *Chipping quality.

The influence of irrigation method on tuber quality factors was assessed during three seasons. Low volume 'mist' irrigation (M), furrow irrigation (F), mist plus furrow (MF) and no irrigation (NI) were ared. Tubers from misted treatments (M MF) tended to be lower in dry matter, had a high incidence of secondary growth and hollowheart, yielded darker chips, required more time to condition, were less mature, and contained more reducing sugars than those from NI treatments. Further the tubers from misted treatments tended to contain more P, Mg, Ca, Fe, Al, B and Mn, than those from NI plots at various times during the latter part of the season. (See also W73-01966) (Waltonpart of the Minnesota) W73-01968

THE INFLUENCE OF A SHORT PERIOD OF EVAPORATIVE COOLING ON THE DISTRIBUTION OF 14C IN POTATO PLANTS, Minnesota Univ., St. Paul. Dept. of Horticultural

D. C. Sanders, P. H. Li, and R. E. Nylund.

HortScience, Vol 7 (4) August 1972. p 420-421. 2 p, 2 tab, 6 ref. OWRR B-013-Minn (7). 14-01-0001-

Descriptors: "Mist irrigation, "Potato, "Tubers, Sugars, Radioactivity, Leaf, Carbon dioxide, "Carbon radioisotopes, "Amino acids. Identifiers: Fixation, Free amino acids.

Potato plants (Solanum tuberosum L. cv. Irish Cobbler) which were intermittently misted fixed more 14CO2 than non-misted plants. Most of the 14C was found in the super fraction with the 14C was found in the sugar fraction with the greatest activity translocating to the top of the plant. The highest 14C in the nonvolatile organic acid fraction was found in the leaf which was fed 14CO2. The radioactivity of the free amino acid fraction was highest in tubers of misted plants, but was highest in the 14CO2 fed leaf of the non-misted plants. (See also W73-01966) (Walton-Minmesoca) W73-01969

THE EFFECT OF FERTILIZERS ON SEED PRODUCTION OF IRRIGATED ALFALFA. (IN UKRAINIAN),

Visn Sil's kohospod Nauk. 7. p 64-66. 1970. Identifiers: *Crop production, *Alfalfa, *Fertilizers, Irrigation, Seeds.

Fertilization and irrigation ensure a good yield response of alfalfa grown for seed. Comparison of increasing rates of P in combination with K applications pointed to P120K60 kg/ha as being the optimum rate for application before sowing. As a result of this treatment the seed yield was increased by 45.2% compared with the unfertilized control.—Copyright 1972, Biological Abstracts, W73-01997

AGROMETEOROLOGICAL CONDITIONS AND CHARACTERISTICS OF THE MAIZE DEVELOPMENT IN THE PLANTING-SPROU-TING PERIOD, (IN BULGARIAN), Maize Research Inst., Knezha (Bulgaria).

Rastenievod Nauki. Vol 8, No 7, p 3-11. 1971. Il-

Rastemervot randar.

Jus. English summary.

Identifiers: *Crop production, Development, *Maize, Meteorology, Moisture, Planting, Soils,

The relationship was studied between the duration of the planting-sprouting period of maize and agrometeorological conditions. This duration deagrometeorological conditions. I his duration de-pends upon the temperature and moisture of soil and the planting depth. The optimum planting depth of maize (6-8 cm) may be calculated by an equation. The equation confirmed the stability of the relationship for maize hybrids with different earliness. The greatest coincidence between the actual values and those determined by means of the equation was established when the productive moisture of the 0-10 cm soil layer was 15 mm.—Copyright 1972, Biological Abstracts, Inc. W73-01999

THE DEVELOPMENT OF RICE GRAINS UNDER CONTROLLED ENVIRONMENT: II. UNDER CONTROLLED ENVIRONMENT: II.
THE EFFECTS OF TEMPERATURE COMBINED WITH AIR-HUMIDITY AND LIGHT INTENSITY DURING RIPENING ON GRAIN
DEVELOPMENT,
Tohoku Univ., Sendai (Japan). Faculty of Agricul-

Tohoku J Agric Res. Vol 22, No 2: p 69-79. 1971.

Identifiers: *Crop production, Environment, Grains, Humidity, Light intensity, *Rice, Tem-

The rate of ripening progressively increased as the temperature increased, being highest where ripening almost ceased at the 2nd-3rd wk after fertilization. In reverse proportion to the rate, the final weight was progressively greater as the tempera-ture declined, slowing the ripening rate. At higher ture declined, slowing the ripening rate. At higher temperatures, a low air humidity was more favorable for ripening, but at lower temperatures the humidity had little effect. Low light intensity markedly depressed ripening with less production and translocation of photosynthate to grains and caused a higher percentage of nitrogen in both grains and straw. In this experiment, the N absorption was not significantly influenced by the treatments, but the TAC (total available carbohydrate) accumulation was progressively greater as temperature decreased, as air humidity decreased with higher temperatures, and as light intensity increased with all temperatures. With scantiness of assimilates at higher temperatures, the early flowering grains were preferentially deprived, causing much variation in grain weight. Usually the kernel weight was higher in the grains located in the upper part of a panicle and at locations 1,5,4, and 1 of each primary and secondary branch, respectively. Under lower temperatures, a longer period of photosynthesis with a lower rate of respiration accompanied with gradual translocation of assimilates to grains possibly caused the high accumulation of TAC in shoots and produced grains of relatively uniform weight, due to a ments, but the TAC (total available carbohydrate) high accumulation of TAC in shoots and produced grains of relatively uniform weight, due to a decreased competition among them for assimilates. There was a strong correlation between grain DW (dry weight)/straw DW and grain N content/straw N content, suggesting a parallel translocation of N and carbohydrate to grains. However it is clear that at higher temperatures relatively less, and at lower temperatures relatively more TAC accumulated in grains, making the N percentage of both grains and straw higher at the former and lower at the latter. The final kernel weight indicated that 'IR-3' was more tolerant of higher temperatures than 'Norin-17.' The optimum temperature for ripening was 20/15 C (daily mean of 17.5 C) for both varieties, which is lower than reported previously.—Copyright 1972, Biological Abstracts, Inc. stracts Inc.

THE INFLUENCE OF POST-IRRIGATION SOIL CULTIVATIONS ON THE SUGAR BEET YIELD, (IN BULGARIAN), Academy of Agricultural Sciences, Pavlikeni (Bul-

garia). Experiment Station of Irrigated Agricul-

P. Erussalimov Rastenievod Nauki. Vol 8, No 7, p 111-121, 1971. English sum

English summary. Identifiers: *Crop production, *Cultivation, Irriga-tion, Soils, *Sugar beets, Weed control.

The root yield, the dynamics of soil moisture. weed infestation, compactness of soil, dynamics of root growth, leafage increase and sugar accu-mulation were observed. Soil cultivation after irrigation is a mechanical means of preventing a secondary weed infestation of the sugar beet fields by use of irrigation water. On soils free from by use of irrigation water. On sous ree from weeds such cultivation is not necessary, since the leaf area of the crop is 6-8 times larger than the crop area, thus being of much greater importance to the conservation and utilization of soil moisture. They do not substantially affect the soil compactness and the dynamics of root growth, leaf mass increase and sugar accumulation in beets.—Copyright 1972, Biological Abstracts, Inc.

BIOLOGICAL AND ECONOMIC PROPERTIES OF CERTAIN FOREIGN IRRIGATED SOFT WHEAT VARIETIES, (IN BULGARIAN), Academy of Agricultural Sciences, Tolbukhin Academy of Agricultural Sciences, To (Bulgaria). Inst. of Wheat and Sunflowers. I. Doncheva, and V. Gotzova. Rastenievod Nauki. Vol 8, No 7, p 47-58. 1971. IIlus. English summary. Identifiers: *Crop production, Biology, Economics, Fertilization, Hardiness, Irrigation, Varieties, *Wheat, Winter. Biology,

The performance of foreign soft wheat varieties was tested under irrigation. The following cultivars were tested: 'Bezostaya 1,' 'Rannaya 12,' 'Lutescens 32' (Soviet), 'San Pastore, 'San Prospero,' 'Frassino,' 'Valdikiana' (Italian), 'Chambord, 'Languedoc' (French), 'Crwa Zvezda,' 'Novi Sad 314,' 'Bachka' and 'Osijeka 131/11' (Yugoslav). The popular Soviet cultiva 'Bezostaya 1' was used for a control (check).

Field 03-WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3F—Conservation in Agriculture

Under irrigation, the tested cultivars had substantially different properties. 'Bezostaya 1,' 'Rannaya 12' and 'Lutescencs 32' possessed highest, and 'Frassino' and 'San Pastore,' the lowest winter hardiness. 'Frassino,' 'Bachka,' 'San Prospero' and 'Osijek 131/11' are most resistant to lodging. 'Osijek 131/11' ranks first in disease resistance, followed by 'Crvena Zvezda,' 'Novi Sad 314' and 'Rannaya 12.' All cultivars tested were earlier than 'Bezostaya 1.' A favorable soil moisture regime, accompanied by a suitable soil fertilization, produced more protein and gitten in the grain. With regard to strength and baking qualities of the flour, the Soviet cultivars are very good. The Italian, French and Yugoslav cultivars pos-sess unsatisfactory breadbaking qualities. 'Crvena Zvezda' and 'Rannaya 12' make best use of rich Lvezua and Kannaya 12' make best use of rich moisture and nutrient regime of soil and produce highest yields, i.e., 7580 kg/ha and 7520 kg/ha, respectively. "Rannaya 12' is most suitable for growing as an irrigated crop under farm conditions.—Copyright 1972, Biological Abstracts, Inc. W73-02004

THE TRIFOLIUM L. SPECIES OF PECHORA'S FLOODPLAIN,

RASIDERAN,
A.L. Chuprova.
Rastit Resur. Vol.7, No.4, p.603-605, 1971.
Identifiers: "Clovers, Carotene, Flood-plains, Pechora's floodplain, Proteins, Species, Trifolium, Trifolium lupinaster d, Trifolium medium D, Trifolium pratense D, Trifolium repens D, USSR.

The description and forage characteristics of the Trifolium L. species are given. The investigated species were: T. repens L., T. lupinaster L., T. pratense L., and T. medium L. Valuable ecotypes of the species were selected: for hay production, T. pratense and T. repens; for pasturage, T. T. pratense and T. repens; for pasturage, T. repens; to turn the sand into meadow, T. pratense and T. repens. The species on Pechora's floodplain have great yields of green mass: T. pratense, up to 105 metric centner (m.c.)ha; T. medium, 84 m.c./ha, and T. repens, 68 m.c./ha. The local species are of high feed value; the content of crude protein is between 20 9-23.5%, and that of the carotene-between 84.5-95.2 mg/kg.—Copyright 1972, Biological Abstracts, Inc. W73-02005

THE EFFECT OF SOME METEOROLOGICAL FACTORS ON BUCKWHEAT YIELD, (IN RUS-

SIAN), E. A. Kozhemyachenko.

Meteorol Klimatol Gidrol Mezhved Nauchn Sb. 6. p 143-146. 1970. English summary. Identifiers: "Crop production, "Buckwheat, Meteorology, Precipitation, Temperature, USSR.

Statistical treatment of buckwheat yield data of the steppe and forest-steppe belts of the Ukraine and Moldavia was made in conjunction with meteorological data. Correlations were made between buckwheat yields, precipitation, and mean daily air temperature. Coefficients of linear regression were computed for the critical period extending for four 10-day periods, of these the first prior to flowering and 3 others after the onset of flowering. It is assumed that yield reduction in the Steppe region is due to insufficient precipitation during the critical development period. In the forest-steppe area, yield depression in dry years is due to the same cause. In years with excessive due to the same cause. In years with excessive precipitation (more than 130 mm in the course of the critical period) and a large number of cloudy days (15-20), the reasons for unsatisfactory yield, beside adverse conditions for pollination, are low light intensity.—Copyright 1972, Biological Abstracts, Inc. W73-02006

EFFECT OF MINERAL FERTILIZERS AND IR-RIGATION ON THE YIELDS OF BASIC CROPS, (IN RUSSIAN), Tsanko Gruev.

Vses Nauchno-Issled Inst Udobr Agropochvoved 47, p 44-60, 1970.
Identifiers: *Crop production, Corn, Crops, *Fertilizers, *Irrigation, Minerals, Molybdenum, Nitrogen, Potassium, Sugar beets, Wheat.

Experimental data are summarized on the manus ing and irrigation of wheat, sugar beet and corn in 1956-1966 and data on the interaction between 1956-1966 and data on the interaction between manuring and irrigation, and the effect of fertilizer doses on water consumption by the crops and their yields. Liming and dressing with Mo are discussed in particular. In all irrigated soils N fertilizers proved to be the most effective, whereas K fertilizers were the least effective. The mean total effect of manuring and irrigation was 81% for sugar beet, 132% for corn and wheat. High doses of N, P and K (greater than 200 kg/hz) were economically beet, 132% for corn and wheat. High doses of N, P and K (greater than 200 kg/ha) were economically more profitable. The yield increments were 10-20 kg wheat and 3-34 kg corn/kg N, 4-12 kg wheat and 5.5-14 kg corn/kg P205.—Copyright 1972, Biological Abstracts, Inc. W73-02007

DETERMINATION OF MOISTURE SUPPLY AND COTTON YIELD IN UZBEKISTAN, (IN RUSSIAN), A. K. Abdullaev. Meteorol Gidrol. 7. p 68-73. 1970. English summa-

ry. Identifiers: *Crop production, *Cotton, *Availa-ble water, Plant height, Moisture, Plants, USSR, *Ilzbekistan.

Records of the Central Asian Hydrometeorological Scientific Research Institute and of the Hydrometeorological Service of the Uzbek SSR made it possible to plot a biological curve of water requirements and to compute equations expressing the relationship between effective cotton yield and its various components. Plant height was also cor-related with water consumption and water supply rates.—Copyright 1972, Biological Abstracts, Inc. W73-02008

SOME IMPORTANT ASPECTS OF THE BREEDING, IRRIGATION, AND AGROTECHNIQUES OF RICE, (IN RUSSIAN).

Kolos, Moscow. 1970. 232p. Illus. Identifiers: *Crop production, Breeding, Irrigation. *Rice.

This collection consists of proceedings of the All-Inis collection consists of proceenings of the Ali-Union Conference on rice cultivation under the auspices of the Division of Plant Growing and Breeding of the Lenin All-Union Academy of Agricultural Sciences and the All-Union Scientific Research Institute of Rice. More than 60 papers were presented on various aspects of rice physiology, genetics, breeding, seed production, improvement of rotation, development of scienphysiology, geneucs, preeding, seed production, improvement of rotation, development of scientifically designed irrigation systems, land reclamation, mechanization, fundamental economic and organizational problems, control of weeds, diseases and pests.—Copyright 1972, Biological Abstracts. Inc. stracts, Inc. W73-02009

PHYSIOLOGICAL ASPECTS OF THE WATER REGIME OF PLANTS AS RELATED TO DROUGHT RESISTANCE STUDIES OF SOME OIL CROPS, (IN RUSSIAN),

I. N. Terent eva.

Tr Mol Nauchn Sotrudnikov Krasnodar NauchnoIssled Inst Sel'sk Khoz. 2. p 129-136. 1970.
Identifiers: *Crop production, *Drought
tolerance, Flooding, Mustard, Oil crops, Physiology, Plants, Seeds, Sunflower, USSR.

The dynamics of water regime of Indian mustard transferred from optimal water supply to conditions of water deficiency or excess depends on the duration of the unfavorable factors. Drought or flooding for 6-8 days caused a repeated change in

hydration, which depended on plant resistance. In Indian mustard with optimal and, more particularly, with inadequate water supply, a correlation existed between the amount of total and free water existed between the amount of total and free water and the seed yield. In the case of sunflower, the heaviest yield is produced by plants with the highest bound water content. The role of total water content in determining the yield components increases in the second half of the vegetative period. In soils with high N and phosphate contents, K had a favorable effect on the plant water regime.—Copyright 1972, Biological Abstracts, Inc.
W73-02013

BIOLOGICAL CHARACTERISTICS OF CRAN-BERRIES AND THE PROBLEM OF THEIR CULTIVATION. 1. EFFECT OF GROUND WATER LEVEL, SAND LAYER THICKNESS AND TYPE OF PEAT ON ROOTAGE OF CUTTINGS AND SHOOT GROWTH, (IN LIPHILANIAN) LITHUANIAN), Akademiya Nauk Litovskoi SSR, Vilnius. Inst. of

Botany. V. F. Butkus, and R. Y. Kviklite.

Liet Tsr Mokslu Akad Darb Ser B. 1. p 111-122. 1971. Illus. English summary. Identifiers: Biological studies, *Cranberries-D, Cultivation, *Cuttings, *Ground water level, Ox-ycoccus-Quadripetalus-D, *Peat, Sand, Shoot

Cranberry (Oxycoccus quadripetalus Gilib.) cuttings roots and grows best of all when ground-water is at the depth of 30-40 cm. Growth and rooting decrease due to the shortage of moisture when groundwater level is 60-80 down or due to poor creation when groundwater rises to 10 cm. when aeration when groundwater rises to 10 cm; when the groundwater level is at the surface, grafts do not root at all. With the sufficient quantity of not root at all. With the sufficient quantity of moisture grafts grow best in the sandless layer. In sand, roots were thick, sparse and shorter; in turf, they were long, thin, abundantly branched and tufty. With the shortage of moisture the sand layer of 2.5-5.0 cm had a positive effect upon rooting and growth compared with uncovered peat; sand-covered peat loses considerably less moisture than the uncovered one.—Copyright 1972, Biological Abstracts Inc. Abstracts, Inc. W73-02025

SOIL ASSOCIATIONS AND LAND CLASSIFI-CATION FOR IRRIGATION, SOCORRO COUN-

New Mexico State Univ., University Park. Dept.

of Agronomy. H. J. Maker, J. M. Downs, and J. U. Anderson. H.J. Maker, J. M. Downs, and J. U. Anderson. Available from the National Technical Information Service as PB-213 254, \$3.00 in paper copy, \$0.95 in microfiche. Agricultural Experiment Station Research Report 234, New Mexico State University, Las Cruces, 1972. 72 p, 11 fig, 7 tab, 8 ref. OWRR B-015-NMEX (21).

Descriptors: *New Mexico, *Irrigable land, *Soil Descriptors: "New Mexico", "Irrigatole land, "Soul classification, *Land classification, Soil investiga-tions, Agriculture, Irrigation.
Identifiers: "Socorro County, "Soil associations, Firrigation potential, Soil interpretation, Soil characteristics, Soil description.

Information is presented on the suitability of soils in Socorro County, New Mexico for irrigation. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. The general soil map, based on a reconnaissance soil survey, provided the information necessary for the classification for irrigation. The data was organized and presented on the basis of soil associations shown on the general soil man and on associations shown on the general soil map and on the irrigation land classification map. Socorro County has a total of about 4,240,600 acres, of which about 40 percent were considered suitable for irrigation. About 21,454 acres were in irrigation class 1; 435,897 acres in class 2; 792,764 acres in

class 3 2,536, which Inform be us agricu гесгеа W73-0

REUSI ROW Oklaho Agricu A. D. I Availa tion S \$0.95 i Water 1972. 2 Descri *Wate

vation Identif Six in were i time di were record calcula applied rigation individ

rigatio

individ tribute ferent Reuse or con

system have a installi for five W73-0 WATE OF WING N CATIC Akader Physio G. A. S Fiziol

Identif Harder tention The an killed o and de the en was co NaCl s from the pressed cells with and in determ cells di

retainir of the i

these fe

English

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 03

Conservation in Agriculture—Group 3F

class 3; and 453,624 acres in class 4. The remaining cass 3, and 453,024 acres in class 4, the remaining 2,536,861 acres in the county were in land class 6, which was not considered suitable for irrigation. Information is provided on soil resources that can Information is provided on sour resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color, are included. (Creel-New Mexico) W73-02117

REUSE OF SURFACE RUNOFF FROM FUR-

REUSE OF SURFACE RUNOFF FROM FUR-ROW IRRIGATION, Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering. A. D. Barefoot.

A. D. Baretoot.
Available from the National Technical Information Service as PB-213 255, \$3.00 in paper copy, \$0.95 in microfiche. Completion Report Oklahoma Water Resources Research Institute, Stillwater, 1972. 20 p, 5 fig, 5 tab. OWRR A-021-OKLA (2).

Descriptors: *Furrow irrigation, *Surface runoff, *Water reuse, Agricultural runoff, *Water conservation, Costs, Pumps, *Oklahoma.
Identifiers: Reuse systems, Storage pit.

Six irrigated fields in the Oklahoma Panhandle were instrumented to determine the amount and time distribution of surface runoff from furrow irrigation. Type H flumes with water level recorders were used to obtain a |continuous permanent record of the runoff. The volume of runoff was calculated as a percentage of the volume of water applied for the individual sets and each series of iration sets. The variation in runoff percent of the individual sets was analyzed. The characteristics of the time distribution of the runoff from the irrigation sets were defined and used in the design of reuse systems. The runoff percentages from the individual irrigation sets were found to be distributed as a log-normal relationship with a different mean and standard deviation for each field. terent mean and standard overation for each ried.

Reuse systems can be designed with either cycling or continuously operated pumps. Cyclic pumping could be used to accomplish cut-back irrigation. A system with a continuously operated pump requires a smaller pump and pipe size and would have a lower fixed cost. The total annual cost of installing and operating reuse systems is justified for five of the six fields instrumented. W73-02118

WATER-RETAINING FORCES OF THE CELLS WALER-KETAINING FORCES OF THE CELLS OF WINTER WHEAT LEAVES AND TILLER-ING NODES WITH REGARD TO THEIR RE-SISTANCE TO SLOW FREEZING AND DESIC-CATION (IN RUSSIAN), Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.

Physiology.

G. A. Samygin, and A. Z. Livshin. Fiziol Rast. Vol 17, No 4, p 800-807. 1970. Illus.

Figlish summary.

Identifiers: Cells, Desiccation, *Freezing, Hardening, *Leaves, Tillering, Turgor, Water retention, *Wheat-M, *Winter wheat leaves.

The amount of water, retained by the living and The amount of water, retained by the n'hing and killed cells of the leaves and tillering nodes, was determined during slow and prolonged freezing and desiccation at various dehydrating forces of the environment. The magnitude of these forces was considered to be equal to the freezing point of NaCl solutions, equilibrated for desiccated cuts from the leaves and tillering nodes, and was expressed in deg C. The amount of water in the living cells with removed negative turgor (at desiccation) and in the killed cells (during freezing) was also determined. The amount of water, retained by the cells due to negative turgor and additional waterretaining forces, was determined as a percentage of the initial quantity, as well as the magnitude of these forces (in deg C). Living cells retained more water than the killed cells both during freezing and desiccation; in each case these amounts of water

differed only slightly at the equal dehydrating force of the environment. This difference was more pronounced in the nodes than in the leaves. The cells of non-hardened plants retained more water, both during desiccation and freezing, due to negative turgor than the cells of hardended which suggest larger negative turgor in the former. On the contrary, the cells of the hardened nodes retained much more water in both cases due to additional forces, since these forces were larger in hardened plants than in non-hardened plants. The magnitude of these forces in the leaves was considerably lower than in the nodes and, hence, un-reliable.--Copyright 1972, Biological Abstracts, Inc. W73-02123

AFTER EFFECT OF ATMOSPHERIC DROUGHT OF COUPLING OF OXIDATION AND PHOSPHORYLATION PROCESSES IN THE LEAVES OF BEAN PLANTS WITH DIF-FERENT DROUGHT-RESISTANCE (IN RUS-

Akademiya Nauk SSSR, Moscow, Inst. of Plant

Physiology. S. V. Kushnirenko, and T. A. Usanova. Fiziol Rast. Vol 17, No 4, p 795-799. 1970. English summary.

Identifiers: Atmospheric drought, *Bean-D, *Drought, Hardening, *Leaves, *Oxidation, Phenols, *Phosphorylation, Plants.

The effect of atmospheric drought was studied on coupling of the oxidation and phosphorylation processes in the leaves of bean plants, droughthardened according to Henckel. Respiration rate was determined in a Warburg apparatus; coupling of the oxidation and phosphorylation processes was evaluated by the effect of 2,4-dinitrophenol (DNP) on respiration. Respiration rate of the 19day-old hardened (less damaged) plants 1 day after cessation of drought increased as a result of DNP treatment, while it did not change or even decrease in the non-hardened (more damaged) plants. O2 consumption of all 56-day-old plants increased in the presence of DNP, but it was more pronounced in the hardened plants even 10 days after drought. The degree of leaf damage by atmospheric drought is concluded to be connected with coupling of the oxidation and phosphorylation processes.—Copyright 1972, Biological Abstracts, Inc. W73-02134

CHANGES OF SOIL MOISTURE UNDER LU-CERNE AND MAIZE STANDS GROWN FOR GREEN MASS (IN CZECH), Vyskumny Ustav Rastlinnej Vyroby, Piestany. For primary bibliographic entry see Field 02G.

A HYBRID COMPUTER PROGRAM FOR PRE-OHNOTING THE CHEMICAL QUALITY OF IR-RIGATION RETURN FLOWS, Ohio Univ., Athens. Dept. of Civil Engineering. For primary bibliographic entry see Field 05B. W73-02177

SOIL AMELIORATION CONDITIONS IN THE AKDALA IRRIGATED MASSIF (ON THE EX-AMPLE OF THE BAKHBAKHTA RICE GROW-NG SOVKHOZ) (IN RUSSIAN), A. Zhamankulov

Tr Kaz S-Kh Inst. Vol 13, No 2, p 36-42, 1970. Identifiers: *Soil amelioration, Growing, *Akdala irrigated massif, Physicochemical properties, *Rice-M, Soils, USSR.

A brief description of the physicochemical properties of soils fit for rice growing and their tentative agromeliorative grouping is given.--Copyright 1972, Biological Abstracts, Inc. W73-02184

DRAIN AND IRRIGATE WITH THE SAME SYSTEM,

North Carolina State Univ., Raleigh. G. J. Kriz.

O. J. Kriz. World Farming, Vol 13, No 11, p 30, Nov 1971. OWRR A-033-NC (4).

Descriptors: *Irrigation design, *Subsurface irrigation, *Trainage systems, *Subsurface drainage, Surface-groundwater North Carolina, Coastal Plains.

A summary review is presented of some implications of a field study to determine the feasibility of combined subirrigation-drainage systems on soils with shallow natural water tables. Benefits of the combined system are cited. This system is applicable to situations with a high water table or im-permeable layer located 3-7 feet below the soil sur-W73-02353

ALTERNATIVE DEMANDS FOR WATER AND LAND FOR AGRICULTURAL PURPOSES, Iowa State Univ., Ames. Center for Agricultural and Rural Development. For primary bibliographic entry see Field 06D. W73-02363

THE INFLUENCE OF MIST IRRIGATION ON THE POTATO: II. GROWTH AND DEVELOP-

Minnesota Univ., St. Paul. Dept. of Horticultural

American Potato Journal, May 1972, Vol 49, No 5, p 187-195. 9 p, 7 tab, 14 ref. OWRR B-013-Minn (3). D. C. Sanders, and R. E. Nylund.

Descriptors: *Mist irrigation, *Potato, *Moisture stresses, Plant temperatures, Plant growth, Tubers, Canopy, Climate. Identifiers: *Haulm, *Senescence, *Split plot

The influence of irrigation method on potato growth and development was assessed during three years. Low volume mist irrigation (M), furrigation (F), mist plus furrow (MF) and no irrigation (NI) were compared. During a high and moderate stress season misting maintained the haulm later into the season and increased the proportion of small and medium size tubers. Further during the high stress season misted plots (M and MF) yielded more than NI plots. Misting was effective in increasing haulm size only during years of high or moderate stress. Mist irrigation main-tained the haulm in a more active state later in the season as indicated by the fact that FW (weight of all plant parts) was increased more by misting than was DW (dry weight of all plant parts). The delay in haulm senescence affected the final yield of tubers only during the year of high stress. But when tubers were sized another picture became apparent. As the degree of stress for the season in-creased, the misted treatments tended to produce more tubers especially in the small and medium size classes. Reduction of stress by misting favors initiation of tubers especially during high stress periods later in the season. Further, the high light periods sater in the season. Further, the high ught intensity which is accompanied by stress is favorable to growth of tubers. If the growing season had been longer, presumably, these small tubers would have increased in size and resulted in a greater total yield as had been previously found. (See also W71-01656) (Walton-Minnesota)

THE INFLUENCE OF MIST IRRIGATION ON POTATO: III. NUTRIENT CONTENT OF LEAVES, Minnesota Univ., St. Paul. Dept. of Horticultural

D. C. Sanders, R. E. Nylund, and E. C.

Field 03-WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3F-Conservation in Agriculture

American Potato Journal, Vol 49, No 5, p 218-226, June 1972. 9 p, 7 tab, 31 ref.

Descriptors: *Mist irrigation, *Potato, *Nutrients, Moisture, Stresses, Foliage, Leaves, Irrigation effeciency.
Identifiers: *Petioles, *Petiolar, *Senescence.

The influence of irrigation method on nutrient con-The influence of irrigation method on nutrient content of potato leaves throughout the season was assessed during three years. Low gallonage 'mist' irrigation (M), furrow irrigation (F), mist plus furrow (MF), and no irrigation (NI) were compared. Leaf blades and petioles from Kennebec (1967, 1968, 1969) and Irish Cobbler (1968, 1969) plants were analyzed for P, K, Ca, Mg, Fe, Za, Mo, Mn, Cu, B and N. Levels of Mo, Mn, Cu, and B did not differ either between treatments or during the Cu, B and N. Levels of Mo, Mn, Cu, and B did not differ either between treatments or during the season. Leaves from different irrigation methods did not differ consistently in levels of N, K, Mg, Ca or Fe. However, during the latter part of two seasons N1 plants contained less P and K and more Fe than M or MF plants. F plants were similar to NI plants in nutrient content except that P was lower in the latter. No matter what the irrigation method, N declined as plants matured. Irrigation method, N declined as plants matured. Irrigation freatment did not influence the K or Fe levels of K or Fe levels of petioles consistently. On several sampling dates MF plants were intermediate. Leaves and petioles of M and MF plants consistently contained more Zn throughout all three seasons than non-irrigated or furrow irrigated plants and, in constrast to the latter, Zn content did not decline as plants matured. (See also W71-01656) (Walton-Minnesota)

EFFECT OF FOLIAR SPRAY AND SOIL APPLICATION OF CCC ON TRANSPIRATION AND DRY MATTER PRODUCTION OF SPRING

WHEAT, Lantbrukhogskolan, Uppsala (Sweden). For primary bibliographic entry see Field 02D. W73-02499

IRRIGATION MANAGEMENT-A TOOL FOR

IRRIGATION MANAGEMENT-A TOOL FOR AGRIBUSINESS, Bureau of Reclamation, Denver, Colo. Water Operations Branch. N. W. Schild, and H. R. Nelson, Jr. Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IRS, Paper 9211, p 347-361, September 1972. 7 fig, 3 tab, 10 ref.

Descriptors: *Irrigation operation and main-tenance, *Irrigation efficiency, *Management, *Computers, Agricultural engineering, Soil moisture, Water distribution (Applied), Reclama-tion, Water resources, Crops, Optimum development plans. Identifiers: *Agribusiness, *Jensen-Haise method, *Climatic parameters, Crop consumptive use.

Irrigation Management is a tool whereby timely application of water can improve irrigation efficiencies. Irrigation Management has been made possible by adaptation of a computer program to the Jensen-Haise method of computing crop consumptive use. A daily soil moisture level balance is available by inserting climatic parameters for a computer printout at a specific time. These printouts are presented to irrigators who can be shown when the next irrigation application will be required for a specific field. This will improve irrigation efficiencies because the water will be applied when the soil moisture level is deficient. Data previously collected indicated that irrigators were unaware of soil moisture levels when applying Irrigation Management is a tool whereby timely previously collected indicated that irrigators were unaware of soil moisture levels when applying water. Irrigation Management Services being conducted by Bureau of Reclamation personnel in Kansas and Wyoming are presented. Data for the Irrigation Management have been analyzed showing results during 1971. The future of Irrigation Management is exploited and incorporated with operation of irrigation systems. (Bell-Cornell)

W73-02546

04. WATER OUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

A PROGRAM FOR ESTIMATING RUNOFF FROM INDIANA WATERSHEDS, PART HI ANALYSIS OF GEOMORPHOLOGIC DATA AND A DYNAMIC CONTRIBUTING AREA MODEL FOR RUNOFF ESTIMATION, Purdue Univ., Lafayette, Ind. Water Resources Research Center. For primary bibliographic entry see Field 02A. W73-01952

ADMINISTERING STATE RESOURCES: THE NEED FOR LONG RANGE PLANNING, bibliographic entry see Field 06E. For primary W73-01979

MILITARY OCEAN TERMINAL, SU POINT, NORTH CAROLINA (DRAFT VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Wilmington, N.C. SUNNY

Available from the National Technical Informa-tion Service as PB-207 726D, \$3.00 in paper copy, \$0.95 in microfiche. March 20, 1972. 160 p, 19 fig, 26 tab, 34 ref, 1 append.

Descriptors: *North Carolina, *Environmental effects, *Channel improvement, *Dredging, Channels, Channeling Spoil banks, Water pollution sources, Transportation, Ships, Operation and maintenance, Harbors, Inland waterways, Navigation, Rivers, Disposal, Landfills, Dikes, River basins, Excavation.

Identifiers: *Environmental Impact Statements, *Sunny Point (N.C.).

The proposed project consists of the removal of approximately 3.2 million cubic yards of material every two years from existing basins and channels in the Cape Fear River at the Military Ocean Terminal, Sunny Point in Brunswick and New Hanover Counties, North Carolina. The material will be deposited in diked areas to be constructed. will be deposited in diked areas to be constructed on federal property. The project will improve the safety and convenience of the terminal to military and civilian shipping. The adverse environmental effects are: complete alteration of 64 acres of cypress swamp and 27 acres of ponds that are habitats for ospreys, alligators and other wildlife; temporary turbidity during dredging; possible salt water damages from percolation or from decanted dredge slurry water; and elimination of all present biotic communities presently found in the 800-acre dredge slurry water; and elimination of all present biotic communities presently found in the 800-acre disposal area. Alternatives are: (1) no action, (2) deposit dredged material on federal property on the east side of the Cape Fear River, (3) use dredge material for beach nourishment, (4) use hopper dredges to remove the material and deposit it asea, (5) place dredged material within dikes in the Cape Fear River, and (6) unconfined disposal of the dredged material in the Cape Fear River. (Wheeler-Florida)
W73-01981

PORT HUENEME HARBOR, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 08A.
W73-01984

ALUM CREEK LAKE, ALUM CREEK, SCIOTO RIVER BASIN, OHIO (DRAFT ENVIRONMEN-TAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. W73.01986

LYTLE AND WARM CREEKS, SAN BERNAR-DINO COUNTY, CALIFORNIA (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 08A. W73-01987

RIRIE DAM AND LAKE, WILLOW CREEK, IDAHO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 08D.
W73-01988

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Portland, Oreg. For primary bibliographic entry see Field 08D. W73-01989

WHITEOAK DAM AND RESERVOIR, WHITEOAK CREEK BASIN, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. For primar W73-01990

TEHAMA-COLUSA, CENTRAL VALLEY PRO-JECT, CALIFORNIA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 08A. W73-01994

HEMPSTEAD HARBOR, NEW YORK NAVIGA-TION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, New York. For primary bibliographic entry see Field 08A. W73-01995

THE WHITE AMUR FOR AQUATIC WEED CONTROL, Florida Univ., Fort Lauderdale. Dept. of Agrono-

my. J. E. Michewicz, D. L. Sutton, and R. D.

Blackburn. Weed Sci. Vol 20, No 1, p 106-110. 1972. weed Sci. Vol. 20, NO 1, p 106-110, 1972.
Identifiers: *Aquatic weed control, Fish diets, *White Amur, Biology, Ctenopharyngodon idella, Fish, Temperature, Tolerance.

The use of herbivorous fish for the biological control of aquatic weeds has great potential. The susceptibility of most herbivorous fish to low temperature is the principal factor limiting their use in the USA. The white amur (Ctenopharyngodon idella Val.) can tolerate low temperature and other water quality extremes. This fish has a voracious appealit for many courtie plants and offer attainments. appetite for many aquatic plants, and after attaining a length of 30 mm, it is almost exclusively phytophagous. Factors affecting the feeding habits of the white amur include the species of plants and water temperature. The white amur has been inwater temperature. The water amur has been in-troduced for aquatic weed control in various coun-tries. This fish might ameliorate some of the aquatic weed problems in the USA, and also pro-vide a new source of protein.—Copyright 1972, Biological Abstracts, Inc. W73-02010 CREST-S COLLEC TEMBER Geologica For prima W73-0203

COMPAR ON PLAT AARGAU J. Pfaden Veroeff G 70, 1971, I Identifier parative Melica-M cus-D, So

Transects oak-fir fo Bazzania Fagetum Fagetum edaphic p showed gr others. O ference (I observed (NO3, NE humid soil and conse transects Distinct c which cau other.--Co W73-0205

SERVATION (PROBLE VODNYK Belorussk Melioratsi (USSR). Izdatel'stv

PROBLEM

Gatillo, an Descriptor Water co treatment, treatment, control, V plied), Hy water, Irr studies, Co

Identifiers

Woodland

This collec dealing wit resources i subjects di diking to p (2) origin o effect of re (4) moistu sandy soils dustrial wa water-polluflocculants water of m tion of co systems: (9 ties of unst (10) applic processing late hydrog water flow. W73-02061

WATER QUANTITY MANAGEMENT AND CONTROL-Field 04

Control of Water on the Surface-Group 4A

CREST-STAGE GAGING STATIONS IN OREGON-A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEP-

TEMBER 1972, Geological Survey, Portland, Oreg. For primary bibliographic entry see Field 07C. W73-02034

COMPARATIVE ECOLOGIC INVESTIGATION ON PLATEAU FIR FOREST IN THE WESTERN AARGAU MOUNTAIN AREA (SWITZERLAND), (IN GERMAN),

I. Pfadenhauer Veroeff Geobot Inst Ruebel Zur. Vol 47, No 1, p 1-70. 1971. Illus. English summary.

Identifiers: "Aargau mountains, Abies-G, Comparative ecology, Fagus-D, "Fir-G, "Forests, Melica-M, Moisture, Mountains, Plateau, Quercus-D, Solls, "Switzerland.

ects were analyzed across ecotones between oak-fir forest (Querco-Abietetum sphagnetosum, Bazzania facies) and beach forest (Melico-Fagetum blechnetosum, M-F b, and Melico-Fagetum caricetosum remotae, M-F c). Various Fagetum caracetosum remotae, M-F c). Various calaphic parameters were measured. Moisture showed great differences between M-F c and the 2 others. Other factors either showed little difference (P, K, C/IN ratio etc.) or the differences observed could be related to moisture conditions (NO3, NH4 etc.) The occurrence of beech on the humid soil of M-F b can be explained by the slope and consequent tangential water movement. The transects (160-170 m) showed distinct gradients. Distinct critical values appeared, the passing of which caused a change from one community to the other.—Copyright 1972, Biological Abstracts, Inc. W73-02056

PROBLEMS IN THE UTILIZATION AND CON-SERVATION OF WATER RESOURCES (PROBLEMY ISPOL'ZOVANIYA I OKHRANY

VODNYKH RESURSOV).
Belorusskii Nauchno-Issledovatelskii Institut
Melioratsii i Vodnogo Khozyaistva, Minsk Melioratsii i

Izdatel'stvo 'Nauka i Tekhnika', Minsk, P. D. Gatillo, and others, editors, 1972. 276 p.

Descriptors: *Water resources, *Water utilization, *Water conservation, *Water purification, *Water treatment, Waste water treatment, Water pollution treatment, Waste water treatment, Water pollution treatment, Water pollution control, Water quality control, Water reuse, Water management (Ap-plied), Hydraulics, Hydrology, Flow, Ground-water, Irrigation, Analytical techniques, Model studies, Computers, Equations. Identifiers: *USSR, *Belorussia, Lowlands,

Woodlands

This collection of 32 papers is devoted to problems dealing with utilization and conservation of water resources in the Belorussian Republic. Among the subjects discussed are: (1) channel regulation and diking to prevent overflow flooding of lowlands; (2) origin of subsurface flow to small streams; (3) effect of reservoir construction on average runoff; (4) moisture exchange in the zone of aeration in sandy soils of woodlands; (5) use of reclaimed industrial waste water in groundwater recharge; (6) water-pollution control in river basins; (7) effect of flocculants on purification of neutral leaching water of machine-building enterprises; (8) calcula tion of coefficients of permeability of disperse systems; (9) distribution of average vertical velocities of unsteady flow in rectangular cross sections; (10) application of analog computers in data processing; and (11) use of analog models to simulate hydrogeologic conditions and to study ground-water flow. (Iosefson-USGS) W73-02061

VEGETATION OF THE AREA OF THE FU-TURE RESERVOIR ON THE KLENOVSKA RIMAVA, Komenskeho Universita, Bratislava (C-

zechoslovakia).
For primary bibliographic entry see Field 02I.
W73-02087

RESEARCH NEEDED ON AVAILABILITY AND DEVELOPMENT OF WATER SUPPLY. American Water Works Association, New York. Committee on Availability and Development of

Water Supply.
For primary bibliographic entry see Field 06B.
W73-02126

THE CORPS OF ENGINEERS CHESAPEAKE

BAY STUDY, Army Engineer District, Baltimore, Md. For primary bibliographic entry see Field 02L. W73-02149

RECENT CLIMATIC CHANGE AND DEVELOP MENT OF THE BRISTLECONE PINE (P. LON-GAEVA BAILEY) KRUMMHOLZ ZONE, MT. WASHINGTON, NEVADA, Arizona Univ., Tucson. Lab. of Tree-Ring

Arizona Univ., Tucson. Lab. of Tree-Ring Research. V. C. LaMarche, Jr., and H. A. Mooney. Arct Alp Res. Vol 4, No 1, p 61-72. 1972. Illus. Identifiers: Bristlecone pine, Climatic conditions, Krummholz zone, "Nevada, "Pine G, Pinus Ion-gaeva G, Precipitation (Atmospheric), Summer, Temperature, "Mt. Washington.

Wood remmants above the present upper tree line are the basis for reconstruction of past changes in tree form and distribution. Living bristle cone pines (Pinus longaeva Bailey) on Mt. Washington, in the Snake Range of east-central Nevada, show progressive gradation in form from tall, crect trees in the upper forest zone to dwarfed, prostate krummholz at the highest elevations. A similar gradient existed from 4000 to at least 2000 gradient and the similar control of the strategient of the similar control of the similar con gradient existed from 4000 to at least 2000 radiocarbon years ago, but the boundaries between vegetational zones based on tree stature were at least 100 m higher than today. The altitude of the krummholz zone is probably controlled by environmental factors affecting hardiness of the tree foliage. The downward shift of the krummholz zone since late. Altithermal time can be attributed either to a decrease in summer tempera ture, an increase in summer precipitation, or both. The krummholz forms of bristlecone pine do not appear to be genetically distinct from the erect trees growing at lower elevations.—Copyright 1972, Biological Abstracts, Inc. W73-02169

FLOW ROUTING MODELS FOR STREAM SYSTEM STUDIES, Geological Survey, Washington, D.C. Water Resources Div. For primary bibliographic entry see Field 02E. W73-02176

THE FOREST OVERSTORY VEGETATION ON THE MISSOURI RIVER FLOODPLAIN IN NORTH DAKOTA, North Dakota State Univ., Fargo.

W. C. Johnson.

Ph D Thesis, September 1971. 185 p, 57 fig, 8 tab, 130 ref, append. OWRR A-022-N Dak (1).

Descriptors: *Forestry, *Flood plains, *Flood control, *Environmental effects, *North Dakota, Vegetation, Forest soils, Trees, Growth rates, Canopy, Missouri River.

The only extensive, remaining floodplain forest in the Missouri Valley in the Dakotas lies in central North Dakota. This area is bounded by Garrison

Dam on the north and Oahe Reservoir on the south, a distance of approximately 80 river miles. Forest communities on the floodplain are no longer periodically inundated as Garrison Reservoir has eliminated flooding throughout the length of the study area. Thirty-four stands were intensively studied. The lack of periodic inundation may have future irreparable effects on the floodplain forests. Tree ring data showed significant decreases in growth in the four major tree species (ash, elm, box elder, and cottonwood) since the cessation of flooding. The lack of additional soil moisture and nutrients may be responsible for the decline in primary productivity which suggests a corresponding decline in ecosystem efficiency. (Woodard-USGS) Dam on the north and Oahe Reservoir on the W73-02185

THE EFFECT OF SOIL AND HYDROLOGICAL CONDITIONS ON THE SETTLEMENT AND PRODUCTIVITY OF TREE AND SHRUB VEGETATION OF DON RIVER FLOODPLAIN, (IN RUSSIAN),

P. P. Arsenov, and I. K. Sviridov.
Nauchn Tr Primorsk S-Kh Inst. Vol 5, No 1, p 101-

127. 1968.
Identifiers: *Don River (Floodplains), Duration, Elm D, Floods, *Floodplains, Growth, Hydrological conditions, Linden D, Oak D, Poplar D, Productivity, Rivers, Settlement, *Shrubs, Soils, Tree, USSR, *Vegetation, Willows D.

There is a certain water level below which each Incre is a certain water level below which each tree and bush does not go. For the almondleaf wil-low a level is acceptable which is flooded up to 280 days in some years; for the white willow up to 125 or even more days; for the black poplar and com-mon elm, up to 115 days; for the white poplar up to 94 days; for the English oak up to 68 days; for the little-leaf linden up to 27 days. The greatest influence on the growth increment is exerted by the duration of flooding. The favorable effect of high water predominates over the unfavorable and the water predominates over the unravorate and the amount of the annual growth increment is directly proportional to the duration of the flooding. An in-crease in the level of the ground water leads to an increase in the growth increment of the woody vegetation. The white willow groves along the crests by the streams are less permanent than the black poplar groves and they are either completely destroyed, leaving a meadow behind, or go over into black poplar groves. But the black poplar groves are not permanent, and they are replaced by the elm and then oak. Other changes are possiby the elm and then oak. Other changes are possi-ble in biogeocoenoses.—Copyright 1972, Biological Abstracts, Inc. W73-02199

TSUGA HETEROPHYLLA FOREST AT LAKE MCDONALD, GLACIER NATIONAL PARK, U.S.A., AND ITS PHYTOGEOGRAPHY, Jagellonian Univ., Krakow (Poland). Dept. of Systematics, Geography and Botanical Garden. I Kornas J. Kornas.
Fragm Florist Geobot (Krakow). Vol 16, No 1: p
123-136. 1970. Illus. Map.
Identifiers: Floristics, Forests, Geography,
Glaciers, *Lake McDonald, National, Parks,
Thuja-Piccata-G, *Tsuga-Heterophylla-G, Vaccinio-Piceetea.

The floristic composition and structure of a mon-tane climatic climax forest with Thuja plicata and Tsuga heterophylla which dominate on relatively moist, western windward slopes of the Front Range in Glacier National Park in the Rocky Mountaine (Montana) were investigated using the Mountains (Montana) were investigated using European phytosociological methods. The floristic ropean phytosociological methods. The Horistic list of the community discussed is rather poor but extremely uniform. In the aspect of habit, layering and character of the tree stand and field layer, the community resembles to a high degree European coniferous forests of the Vaccinio-Piceetea class. In an effort to determine long-distance phytogeo-graphical connections of the Thuja-Tsuga forest,

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control of Water on the Surface

its distributional spectrum was established in 2 ways. This showed the decidedly-Western North ways. I ms showed the decledity weeks North American character of the community in-vestigated, demonstrating at the same time its distinctly transcontinental and Circum-Boreal floristic connections. The distributional spectra of individual vegetation layers in the Thuja-Ts individual vegetation layers in the Thuja-Tsuga forest are distinctly different: the tree and shrub layers are constituted exclusively by Western North American species, in the field layer is a marked portion of North American Transcon-tinental and Circum-Boreal species, and the bryophyte layer is composed nearly exclusively of the latter ones. There exist distinct floristic con-sections between the community investigated and nections between the community investigated and European coniferous forests of the Vaccinio-European coniferous forests of the Vaccinio-Piccetea class. They express themselves in: presence of numerous species identical in both areas, occurrence of species represented in each area by another corresponding infraspecific taxon, presence in both areas of pairs of corresponding species.—Copyright 1972, Biological Abstracts, Inc. W73-02201

TAYLORS BAYOU, TEXAS, DRAINAGE AND FLOOD CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.

DREDGING AND FILLING, COWIKEEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (DRAFT ENVIRONMENTAL STATEMENT). Army Engineer District, Mobile, Ala.

Available from the National Technical Informa-tion Service as EIS-AL-72-4604-D, \$3.00 in paper copy, \$0.95 in microfiche. March 27, 1972. 11 p, 1

Descriptors: *Alabama, *Environmental effects, *Dredging, *Recreation facilities, Parks, Marinas, Beaches, Lakes, Recreation, Recreation demand, Boating, Fishing, Spoil banks, Benthic flora, Benthic fauna, Wildlife habitats, Fish, Sunfishes, Turbidity, Excavation.

Identifiers: *Environmental Impact Statements, *Chattahoochee River (Ala).

This project involves the dredging of 60 acres of lake bottom from Walter F. George Lake on the Chattahoochee River in Alabama. The dredged material will be placed on 53 acres of low relief area to be used as a construction site for a state park. The removal of 745,000 cubic yards of material will provide sufficient water depth for construction of a marina. Dredging and filling will eliminate the present overbank exposure during the late fall and winter months and will allow small host access to the marina. A total of 42 acres of the late ran and whiter monais and win above assume boat access to the marina. A total of 42 acres of land and 21 acres of water bottom and associated flora and fauna will be covered by dredged material. This will displace some wildlife on upland areas and eliminate some terrestrial wildlife habitat. A few fish may be adversely affected by increased turbidities during construction. Removal of a portion of the fish attractor area will reduce crappie habitat with a consequent loss of fishing opportunities. The only alternative considered was to forego action which would permit the congested condition of existing facilities to continue unabated. (Ellis-Florida) W73-02233

BUCKS HARBOR, MACHIASPORT, MAINE (FINAL ENVIRONMENTAL IMPACT STATE-

(RENAL)
MENT).
Army Corps of Engineers, Waltham, Mass. New
England Div.
For primary bibliographic entry see Field 08A.
W73-02234

HIGHLAND LAKE FALL CREEK BASIN, INDI-ANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Louisville, Ky. For primary bibliographic entry see Field 08D.

PEARL RIVER BASIN, EDINBURG DAM AND LAKE, MISSISSIPPI AND LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08D. W73-02254

PUBLIC WORKS ON RIVERS AND HARBORS (BILL S.4018).
For primary bibliographic entry see Field 06E.
W73-02257

MAINTENANCE DREDGING, CHATHAM (STAGE) HARBOR, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Corps of Engineers, Waltham, Mass. New En-

Available from the National Technical Informa-tion Service as EIS-MA-72-4706-D, \$3.25 in paper copy, \$0.95 in microfiche. April 21, 1972. 18 p, 1 map, 1 tab, 4 ref.

Descriptors: *Environmental effects, *Naviga-tion, *Dredging, *Harbors, *Open channels, Hydraulic mining, Navigation, Dikes, Shellfish, Sediments, Economics, Phytoplankton, Silts, Amino acids, Ecology, Turbidity, Commercial fishing, Massachusetts, Shoals, Spoil banks. Identifiers: *Environmental Impact Statements, *Chatham Harbor (Mass).

Incessant shoaling of the lower portion of the 10foot navigation channel of Chatham (Stage) Harbor, Massachusetts, now jeopardizes safe navigation. The proposed project would provide for
periodic maintenance dredging to assure safe
navigation. Using sidecast dredging, required
completion time would be approximately two
weeks. Sediments to be dredged are well within
the open ocean dredge spoil parameters
established by the Environmental Protection
Agency. An open channel will perpetuate longterm economic productivity in the area. Any adverse effects due to dredging and spoiling will be
temporary and localized. Dredging is not proposed
for the upper portion of the navigation channel and for the upper portion of the navigation channel and thus ecology of that area is unaffected. The only thus ecology of that area is unaffected. The only alternative to periodic maintenance dredging is no dredging. Alternatives to sidecast dredging include hydraulic dredging and bucket dredging, both of which are feasible with only temporary damage to marine forms. No major destruction to natural resources is anticipated with the use of any dredge method. (Tolle-Florida) W73-02262

SMALL BOAT HARBOR PROJECT, BETHEL, ALASKA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Anchorage, Alaska.

Available from the National Technical Informa-tion Service as PB-199 620F, \$3.00 in paper copy, \$0.95 in microfiche. February 1972. 30 p, 1 fig, 3 photo, 3 tab.

Descriptors: *Environmental effects, *Alaska, *Harbors, *Channel improvement, Navigation, Inland waterways, Coastal engineering, Excavation, Rivers and Harbors Act, Transportation, Multiple-purpose project, Boating, Recreation facilities, Fishing, Social needs, Access routes, Dredging, Water quality, Water pollution sources, Turbidity, Bank emsion. Bank erosion.
Identifiers: "Environmental Impact Statements,
"Bethel (Alaska), "Brown's Slough (Alaska).

The proposed project involves the dredging of a 5,100 foot long access channel and a 1,700 foot long harbor area in Brown's Slough, in Bethel, Alaska. The project is designed to provide all-tide access to the 1.5 acre small boat beaching and anchorage area from the Kuskokwim River. The width of the access channel will stabilize at 20 feet and will have a usable depth of 6.5 feet at normal river stage. The width of the harbor area will be 40 feet accessing a department of the stable of th river stage. The width of the harbor area will be 40 feet, providing adequate maneuvering space. Channel dredging will eliminate spawning grounds in the existing channel. Dredging will reduce the carrying capacity of the slough to some extent through reduction of food organisms and spawning habitats. 100 acres of low land will be used for disposal of the spoil and earth embankments. Water turbidity will be temporarily increased during the dredging project and bank erosion will contribute to water turbidity for about three to five years. There will be some alteration of river and years. There will be some alteration of river and terrestrial habitats due to project construction. terrestrial habitats due to project construction. The biological carrying capacity of the slough will also be impaired. Alternatives included variations in location of the basin and in the location of the channel. (Beardsley-Florida) W73-02264

BIG CREEK AND METRO ZOO FLOOD AND AESTHETIC IMPROVEMENT, CLEVELAND, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Buffalo, N.Y.

Available from the National Technical Informa-tion Service as EIS-OH-72-4787-0, \$3.50 in paper copy, \$0.95 in microfiche. June 1972. 27 p, 2 map.

Descriptors: *Ohio, *Environmental effects, *Channel improvement, *Flood control, Flood protection, Channeling, Flood damages, Watershed management, Watersheds (Basins), River basins, Excavation, Water management (Applied), Channels, Channel flow, Riprap, Streams, Stream improvement, Streamflow, River regulation.

Identifiers: *Environmental Impact Statements, Cleveland (Ohio).

This project would involve excavation of 4,600 feet of new channel along Big Creek in the Cuyahoga River Basin, Cleveland, Ohio. Flood damages to the Cleveland Zoological Park have been increasing in the area due to commercial development in the flood plain of Big Creek. This project will contain a flood with a recurrence interproject will contain a flood with a recurrence interval of once in fifty years, thus reducing the flood potential to the park. Adverse environmental effects include: temporary traffic, noise and dust due to construction; unpleasant aesthetics since the artificial channel will be lined with riprap along the bottom and side slopes; and discouragement toward the development of a balanced aquatic community within the channel. Alternatives considered include impoundments, improvement by local interests, removal of the zoological park, channel improvement through the zoo property. nocal interests, removal of the zoological park, channel improvement through the zoo property and no action. Also included is Supplemental Data on the Cuyahoga River Basin, Ohio, Restoration Study. (Brackins-Florida) W73-02268

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Louisville, Ky. For primary bibliographic entry see Field 08A. W73-02269

RIVER ROUGE FLOOD CONTROL PROJECT, WAYNE COUNTY, MICHIGAN (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Detroit, Mich.

Available from the National Technical Informa-tion Service as EIS-MI-72-4662-F, \$11.00 in paper

copy, \$0.95 map, 1 phot

Descriptors *Channel *Concrete l tion, Dredg Flood flow structures, distribution Identifiers: *Wayne Co Control Pro

The propose straightenin including bridges, th bridges, nu filled-in oxl Wayne Cou designed to 24,000 cub benefits inv result from existing and be afforded ude the fo realigned an isting green operation; a flora of ups time. Alter levees and upstream re various stru structural w W73-02270

> ECOLOGIC TYPES OF TIVE STRI V. E. Timof Uch Zap Ku 1970. Identifiers: studies, Riv Vegetation

Six geomor gradations regimens we combination types of floo to specific r given of the levsk to the floodplain o decrease in vegetation system was elements of the middle Biological A W73-02276

MANAGEM AREAS, Wisconsin I Flood Plain For primary W73-02288

GREAT LA LENGES FORT ON FRAMEWO Water Resou copy, \$0.95 in microfiche. May 25, 1972. 171 p, 9 map, 1 photo, 2 tab, 4 append.

Descriptors: "Environmental effects, "Michigan, "Channel improvement, "Flood control, "Concrete lined canals, Excavation, Flood protection, Dredging, Flood frequency, Flood plains, Flood flow, Water control, Conveyance structures, Waste water disposal, Bridges, Engineering urres, waste water disposal, Bridges, Engineering structures, Railroads, River flow, Rivers, Water distribution (Applied). Identifiers: "Environmental Impact Statements, "Wayne County (Michigan), "River Rouge Flood Control Project.

The proposed project involves 4.2 miles of channel straightening and enlargement on the River Rouge, including one new and two altered railroad including one new and two altered railroad bridges, three new and two altered highway bridges, numerous utility alterations, and some filled-in oxbows. The entire project is located in Wayne County, Michigan. The enlarged channel is designed to accommodate a 100 year storm flow of 24,000 cubic feet/second. The major project benefits involve prevention of flood damages that result from high stages of the River Rouge under existing and foreseeable future conditions. The adjacent flood prone areas consisting of residential, commercial and heavy industrial complexes would be afforded greater projection. Adverse effects inbe afforded greater protection. Adverse effects in-clude the following: the length of the river will be realigned and shortened 8,600 feet; the natural bottom will be replaced by a concrete bottom; an existing greenbelt will be removed by construction tom will be replaced by a concrete outcom; an ea-sisting greenbelt will be removed by construction operation; and reduced flood levels could alter the flora of upstream flood plains over a period of time. Alternative measures considered include levees and floodwalls, a flood diversion channel, upstream reservoirs, flood plain management, and various structural devices in lieu of the upstream structural works. (Beardsley-Florida) wars. 0279.

ECOLOGICAL AND GEOMORPHOLOGICAL TYPES OF FLOOD PLAIN AND THE VEGETATIVE STRUCTURE OF RIVER VALLEYS OF THE MID-YOLGA BASIN (IN RUSSIAN), V. E. Timofeev.

Uch Zap Kuibyshev Gos Pedagog Inst. 85. p 31-49.

1970. Identifiers: Ecology, Floodplains, *Morphological studies, Rivers, Structure, Types, USSR, Valleys, *Vegetation, *Volga River basin.

Six geomorphological types of floodplain and 5 gradations of the manifestation of ecological regimens were determined. On the basis of their regimens were determined. On the basis of their combination, 13 ecological-geo-morphological types of floodplain were set up which were limited to specific regions of river valleys (a description is given of the Volga floodplain from the city Zhigulevsk to the mouth of the river Chagra and of the floodplain of small rivers of the middle Volga). A decrease in the level of organization of the valley vegetation up to the total loss of signs of the system was observed up river. An extensive dia-gram of the hierarchial system of the structural elements of river valley vegetation in the basin of the middle Volga is also given.—Copyright 1972, Biological Abstracts, Inc. W73-02276

MANAGEMENT PROBLEMS IN FLOOD PLAIN

AREAS, Wisconsin Dept. of Natural Resources, Madison. Flood Plain and Shoreland Management Section. For primary bibliographic entry see Field 06F. W73-02288

GREAT LAKES BASIN COMMISSION CHAL-GREAT LAKES BASIN COMMISSION CHAL-LENGES FOR THE FUTURE. AN INTERIM RE-PORT ON THE GREAT LAKES BASIN FRAMEWORK STUDY. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06B. W73-02291

THE DEVELOPMENT OF ISRAEL'S WATER RESOURCES,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel).
For primary bibliographic entry see Field 06B.
W73-02292

STUDY OF A TOPO-LITHOLOGICAL TRANSECT OF THE EPRAVE-ROCHEFORT SURROUNDINGS (LOMME VALLEY, SOUTHEAST BELGIUM) TO DELIMITATE THE FOREST ECOLOGICAL GROUPS OF THE

CALESTIENNE, Brussels Univ. (Belgium). Laboratoire de Botanique Systematique et d'Ecologie. M. Tanghe.

Bull Soc R Bot Belg. Vol 104, No 2, p 333-371. 1971. Illus. English summary.
Identifiers: *Belgium, *Calestienne, Climate,

Forest, Lithological transects, *Lomme Valley, Moisture, Soil, Surroundings, Valley.

Using a transect complex intentionally chosen in a hilly area on various bedrocks (wooded bend of the Lomme river across Devonian limestone and schist in the Eprave-Rochefort region -SE Belgischist in the Eprave-Rochefort region -SE Belgi-um), an attempt was made to determine the main ecological groups which compose the forest vegetation of the Calestienne region. Twelve ecological groups were distinguished and ecologi-cally defined on the basis of the environmental ditions (climate and soil conditions, namely fertility and moisture) best expressed as humus types which provide the demoninations of the corresponding ecological groups: calcic Mull group; poly-, meso-, oligotrophic Mull groups; Moder group; Mor group; etc. Among these, the calcic Mull group (including the 'calcithermophyte' species) is particularly well developed and typical of the ecological sector, whereas the more or less acidophytic groups are considered to be marginal since they are essentially distributed on silicious ground. This ecological group system is not fundamentally different from those first elaborated for the Belgian Lorraine and the Semois valley.--Copyright 1972, Biological Abstracts, Inc. W73-02294

AOUATIC AND MARSH VEGETATION OF THE TIMIS-BEGA INTERFLUVIAL ZONE,

Institutl Agronomic din Timisoara (Rumania) S. Grigore. Stud Cercet Biol Ser Bot. Vol 23, No 1, p 13-46.

Stud Cereet Biol Ser Bol. vol 23, No 1, p 13-46. 1971. Illus. Map. Identifiers: Aquatic vegetation, *Interfluvial zone, Isoetes P, Lemna M, *Marsh vegetation, Phragmites M,Potamogeton M, *Romania, Timis Bega, Vegetation.

The geographic position, relief, climate, and soils of this zone are shown by the local vegetation, a particularly complex and varied vegetation, in which aquatic and marsh associations occupy an important place. A total of 35 associations of the classes

Lemnetea,

Potamogetonetea. important piace. A total of 3 associations of the classes Lemnetea, Potamogetonetea, Phragmitetea, and Isoeto-Nancjuncetea were presented and analyzed on the basis of the range of bioforms and floristic elements. The dynamics of the vegetation were analyzed under the conditions determined by water improvement work carried out in this area.—Copyright 1972, Biological Abstracts, Inc. W73-02316

SERIAL-CORRELATION STRUCTURE OF DIS-CRETIZED STREAMFLOW, Geological Survey, Fort Collins, Colo. For primary bibliographic entry see Field 02E.

W73-02323

ANNUAL COMPILATION AND ANALYSIS OF ANNUAL CUMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1970, Geological Survey, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02324

ARIZONA FLOODS OF SEPTEMBER 5 AND 6,

National Weather Service, Salt Lake City, Utah. Western Region.
For primary bibliographic entry see Field 02E.
W73-02325

PROTECTION OF WATER SOURCES IN THE LOWER DNIEPER RIVER BASIN (OKHRANA VODNYKH ISTOCHNIKOV V BASSEVNE NIZHNEGO DNEPRA), V. I. Derkachenko. Gidrotekhaika i Melioratsiya, No 7, p 98-100, July

1972. 1 fig.

Descriptors: *Water sources, *Water supply, Water upons: water sources, "Water supply, "Water utilization, "Water balance, "Freshwater, Reservoirs, Rivers, Ponds, Artesian wells, Water quality, Waste water (Pollution), Treatment facilities, Industries. Identifiers: *USSR, *Ukraine, *Dnieper River.

The area of the Lower Dnieper Basin, which includes the Kirovograd, Dnepropetrovsk, Zaporozh'ye, and Kherson Oblasts, is 112,000 sq The water sources which contribute to the freshwater balance in the region include: (1) 3 large reservoirs on the Dnieper (Dneprodzerzhinsk, Dneprovskoye, and Kakhovka) with a normal storage of 23,950 million cu m of high-quality freshwater; (2) 802 small rivers with a water volume of 414 million cu m; (3) 26 small reservoirs with a total water-surface area of 5,516 sq km and a water volume of 624 million cu m; (4) 3,857 ponds with a total water-surface area of 30,200 ha and a water volume of 604 million cu m; and (5) 6,979 artesian wells with a total discharge of 512.6 million cu m a year. The average annual volume of freshwater in the region is estimated to be 23.2 to 225.6 billion cu m. Measures to improve the quality of water sources in the basin are discussed. (Josefson-USGS) W73-02329

HYDROLOGIC INVESTIGATIONS AND FLOW COMPUTATIONS (GIDROLOGICHESKIYE ISS-LEDOVANIYA I RASCHETY STOKA). Nauchno-Issledovatelskii Ukrainskii Meteorologicheskii Institut, Kiev (USSR).

Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 93, Moscow, 1970. 156 p.

Descriptors: *Investigations, *Hydrology, *Flow, *Runoff, Rainfall-runoff relationships, Runoff coefficient, Discharge (Water), Floods, Rivers, River basins, Water types, Water storage, Water balance, Heat balance, Melt water, Ice cover, Hydrographs, Meteorology, Orography, Equa-

Identifiers: *USSR, *Ukraine, *Moldavia, *Carpathians, Dnieper River, Dniester River, Time of travel, Isochrones, Snow avalanches, Hydromet-

This collection of 16 papers is devoted to space-time analysis of hydrometeorological phenomena by stochastic matrices and to determination of the regulating effects of channel and reservoir storage on flood runoff. Among the topics discussed are: on noor funds. Among the topics discussed are:

(1) channel storage of small rivers of the Ukraine;

(2) runoff coefficients for areas between isochrones;

(3) relation of outflow to stream discharges as defined by the water-balance method;

(4) storage component of the water balance of Kakhovka Reservoir in Kherson

Field 04—WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control of Water on the Surface

Oblast; (5) estimates of soil moisture potential in river basins from precipitation measurements; (6) relation between melt-water losses and some hydrologic characteristics; (7) maximum storm ru-noff on rivers of the Upper Dnieper; (8) storm ru-noff coefficients for rivers of the Ukraine and Moldavia; (9) rates and travel time of storm runoff Mologyia; (9) rates and cravel time of storm moni-in the Carpathians; (10) annual streamflow fluctua-tions in the Dniester River basin; (11) thermal regime of rivers, (12) relation of ice freezeup dates and ice-cover duration to elevation and channel slopes of Carpathian rivers; and (13) forecasting of snow avalanches in the Carpathians. (See W73-02331 thru W73-02337) (Josefson-USGS)

COEFFICIENTS RUNOFF FOR AREAS BETWEEN ISOCHRONES (O KOEFFITSIYEN-BETWEEN ISOCHRONES (O KOEFFITSIYEN TAKH YESTESTYENNOGO ZAREGU-LIROVANIYA STOKA NA MEZHIZOKHRON-NYKH UCHASTKAKH), UKrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR).

V. I. Moklyak.

In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovateľ skiy Gidrometeorologicheskiy Institut Trudy, No 93, p 40-43, Moscow, 1970. 1 tab, 8 ref.

*Runoff coefficient, *Discharge (Water), Flood routing, Hydrographs, Hydrograph analysis, Rivers, Watersheds (Basins), Streams, Tributaries, Flood plains, Equations. *USSR, *Ukraine, *Isochrones, Identifiers:

An equation is developed for determining the runoff coefficient representing the runoff which contributes to average daily discharge of a stream. A comparison of computations by this equation with field data for individual lowland rivers of the Ukraine indicates that for most rivers the runoff coefficient for areas between isochrones in closed basins is 0.6, and for areas between isochrones in basins with tributaries it is 0.8. For lowland rivers with a broad flood plain the coefficient decreases by 10% and froug plain the coefficient decreases by 10% and for rivers without a flood plain it may increase by 5%-10%. (See also W73-02330) (Josef-son-USGS) W73-02331

RUNOFF COEFFICIENTS RIVERS OF THE UKRAINE AND MOLDAVIA (KOEFFITSIYENTY STOKA DOZHDEVYKH PAVODKOV NA REKAKH UKRAINY I MOL-

DAVII), Ukrainskii Nauchno-Issledovatelskii Meteorologicheskii Institut, Kiev (USSR). P. F. Vishnevskiy, and L. D. Mikhal'skaya.

In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 93, p 94-104, Moscow, 1970. 3 fig, 1 tab, 3 ref.

Descriptors: *Runoff coefficient, *Storm runoff, *Floods, *Rivers, *Rainfall-runoff relationships, Discharge (Water), Hydrographs, Hydrograph analysis, Meteorology, Gaging stations, Soils, Equations.

Identifiers: *USSR, *Ukraine, *Moldavia, Flood-

producing precipitation.

Investigations of floods and flood-producing precipitation in the Ukraine and Moldavia were based on long-period observations of daily discharges for 170 gaging stations on small rivers of the Republics and on daily precipitation data of 568 meteorological stations in the area for the period 1945-67. Regions within the Republics are tabelized for the period of the subdivided for homogeneity on the basis of runoffcoefficient values and soil-climatic conditions. (See also W73-02330) (Josefson-USGS) W73-02333

INVESTIGATION OF THE RATES AND TRAVELTIME OF STORM RUNOFF IN THE CARPATHIANS (K VOPROSU OB ISS-LEDOVANII SKOROSTEY I VREMENI DOBEGANIYA LIVNEVYKH VOD V KAR-PATAKH),

Nauchno-Issledovatelskii

Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR). P. M. Lyutik, and V. V. Yablonskiy. In: Gidrologicheskiy issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovatel'akiy Gidrometeorologicheskiy Institut Trudy, No 93, p 105-116, Moscow, 1970. 4 fig, 4 tab, 15 ref.

Descriptors: *Storm runoff, *Surface runoff, *Overland flow, *Streamflow, *Time of concentration, Rainfall-runoff relationships, Precipitation Atmospheric), Artificial precipitation, Discharge (Water), Flow rates, Floods, Flood waves, Channels, Watersheds (Basins), Slopes, Ravines, , Soila, Hydrographs, Hydrograph analysis, Equa-

Identifiers: *USSR, *Ukraine, *Carpathian Moun-

Runoff from natural and artificial precipitation, Runoff from natural and artificial precipitation, surface runoff and streamflow rates, and precipitation and runoff from slopes and ravines were investigated in hydrometric observations and investigations conducted in the Rika River basin in 1967 and in basins of the Chernaya Tisza and Prut Rivers in 1968 in the Carpathians. The traveltime of a flood wave, computed from known formulas, was compared with observations made during the flood of June 8-10, 1969. Overland traveltime for a storm floods of rare occurrence accounts for a storm floods of rare occurrence accounts for a arge part of total traveltime in small basins up to 100 sq km. For most watercourses with basin areas exceeding 100 sq km, overland traveltime accounts for a relatively small part (10%-30%) of total traveltime. On the basis of measurements obtotal unvenime. On the basis of measurements obtained, traveltime along slopes and channels of small rivers and streams can be determined, and a relationship between overland traveltime and channel traveltime in a basin can be established. (See also W73-02330) (Josefson-USGS)

ANNUAL STREAMFLOW FLUCTUATIONS IN THE DNIESTER RIVER BASIN (KOLEBANIYA GODOVOGO STOKA REK BASSEYNA DNES-

TRA), Ukrainskii Nauchno-Issledovatelskii Meteorologicheskii Institut, Kiev (USSR). N. I. Kononenko.

In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovateľskiy Gidrometeorologicheskiy Institut Trudy, No 93, p 117-127, Moscow, 1970. 3 fig, 3 tab, 9 ref.

Descriptors: *Streamflow, *Runoff, *Runoff coefficient, *Rainfall-runoff relationships, *Fluctuations, Meteorology, Orography, Rivers, River basins, Groundwater, Rain water, Melt water, Snownelt, Karst, Annual, Seasonal. Identifiers: *USSR, *Ulraine, *Dniester River, *Runoff variability, *Lowlands.

Melt water, precipitation, and groundwater are the major factors responsible for the wide range of long-period fluctuations of annual runoff in the Dniester River basin. Runoff coefficients vary from 0.28 to 0.44 in the Carpathians and from 0.35 from 0.28 to 0.44 in the Carpathians and from 0.35 to 0.55 in the Ciscarpathians. Runoff-coefficient values in the lowland part of the basin generally increase in a southeasterly and southerly direction. Except for upper reaches of the Svicha, Lomnitsa, Bystnitsa Solotvinskaya, and Bystritsa Nadvornyanskaya Rivers, annual streamflow fluctuations for rivers in the mountainous part of the basin depend mainly on variability of snow storage and rainfall during the spring snowmelt period. Annual rainfall during the spring snowmelt period. Annual streamflow fluctuations in upper reaches of the Svicha and Lomnitsa Rivers are governed by orographic and climatic conditions, and annual runoff variability in upper reaches of the Bystritsa Solot-vinskaya and Bystritsa Nadvornyanskaya Rivers

is determined mainly by summer precipitation. The effect of karst on groundwater conditions is The effect of karst on groundwater conditions is particularly evident in the northwestern part of the lowland where there is abundant annual precipitation (700-800 mm), 70% of which occurs in summer. Equations are developed for hydrologic computations in the mountainous part of the basin, and a map of annual runoff coefficients can be used to determine annual streamflow fluctuations in the lowland. (See also W73-02330) (Josefson-INGS) USGS) W73-02335

STUDY OF THE THERMAL REGIME OF RIVERS (OB IZUCHENII TERMICHESKOGO REZHIMA REK), Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR).
N. G. Dyukel'.
In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 93, p 128-134, Moscow, 1970. 2 fig, 1 tab, 7 ref.

Descriptors: *Heat budget, *Heat balance, *Water temperature, *Water types, *Rivers, Gaging sta-tions, Groundwater, Waste water (Pollution), Mine water, Industrial water, Domestic water, In-Identifiers: *USSR. *Ukraine. *Moldavia.

The water temperature pattern in river reaches near industrial centers or hydraulic structures is disrupted by the discharge of mine, industrial, and domestic waste waters into the river and by the domestic waste waters into the fiver and by the regulation of the river by ponds and reservoirs. A 15-20 year period of record of water temperatures is sufficient to reliably determine average long-term characteristics of a river's thermal regime. The number of gaging stations in the Ukraine and Moldavia recording the thermal regime of river reaches with abundant groundwater inflow is 15% of the total number of stations. An even larger number of stations (up to 50%) record the thermal regime of reaches that regime of reaches that are more or less disturbed human economic activity. Standard water-temperature observations in river reaches with abundant groundwater inflow and in those affected by man are not representative of natural conditions (See also W73-02330) (Josefson-USGS) W73-02336

RELATION OF ICE FREEZEUP DATES AND ICE-COVER DURATION TO ELEVATION AND (O SVYAZI SROKOV USTANOVLENIYA I PRO-DOIZHITEL'NOSTI LEDOSTAVA S VYSOTOY PAT),

Ukrainskii Nauchno-Issledovatelskii Meteorologicheskii Institut, Kiev (USSR). N. G. Dyukel'.

In: Gidrologicheskiye issledovaniya i raschety stoka; Ukrainskiy Nauchno-Issledovateľ skiy Gidrometeorologicheskiy Institut Trudy, No 93, p 135-140, Moscow, 1970. 2 fig, 2 tab, 3 ref.

Descriptors: "Ice cover, "Freezing, "Elevation, "Gradients (Streams), "Rivers, Topography, Orography, Climatology, Air temperature, Water temperature, Ice breakup, Discharge (Water), Low flow, Base flow, Flow rates, Ponds, Gaging stations, Variability. Identifiers: "USSR, "Ukraine, "Carpathian Mountains, "Damble River, "Dniester River, Ice thickness, Hydrometric stations.

The ice regime of rivers in small climatically homogeneous areas of the Danube and Dniester basins at elevations of 0-250 m, 251-500 m, and 501-700 m was investigated for variations in dates of ice freezeup. Vertical zonal distribution of air temperature in mountain regions is related to time and duration of freezeup in pools where ice cover is continuous. In mountain river reaches where ice

cover is bro are largely d smaller exte discharges. average chardates are del delayed 3-4 cover is refreezeup in 5-25 days lat generally be 02330) (Josef W73-02337

WATERSHE VOLVING N Purdue Uni Agricultural For primary W73-02348

DRAIN AN SYSTEM, North Carol

COURTS A Environmen For primary W73-02365

WATER UT For primary W73-02431

CONTROL FRESHWA' Department fice of Libra P. A. Skapta Available f tion Service \$0.95 in mi March 1972

Descriptors weeds, *Fr trol, Biocon Aquatic pla Geographic Regulation, Methodolog

Among the

many areas

troduction serious prol when place where they water plants control, and through ear to English into English lants. Cita biological, aquatic wee have been particular c d rice pa for local us tion include plants, her cide termi sources lis Sources Co W73-02444

WATER QUANTITY MANAGEMENT AND CONTROL-Field 04

Control of Water on the Surface-Group 4A

cover is broken, dates and duration of freezeup are largely determined by channel slopes and, to a smaller extent, by climatic conditions and river discharges. With a 1% increase in weighted discharges. With a 1% increase in weighted average channel slope, normal and early freezeup dates are delayed 1-2 days; late freezeup dates are delayed 3-4 days; and average duration of solid ice cover is reduced by 2 days. Average time of freezeup in river reaches with broken ice cover is 5-25 days later than that in pools, and ice breakup generally begins 7-30 days earlier. (See also W73-02330) (Josefson-USGS) W73-02337

WATERSHED PROJECT EVALUATION IN-VOLVING MULTIPLE SOCIAL OBJECTIVES, Purdue Univ., West Lafayette, Ind. Dept. of Agricultural Economics. For primary bibliographic entry see Field 06B. W73-02348

DRAIN AND IRRIGATE WITH THE SAME SYSTEM, North Carolina State Univ., Raleigh. For primary bibliographic entry see Field 03F. W73-02353

COURTS AND WATER, THE ROLE OF THE JUDICIAL PROCESS, Environmental Law Inst., Washington, D.C. For primary bibliographic entry see Field 06E. W73-02365

WATER UTILITY DISTRIBUTION LOSS, For primary bibliographic entry see Field 05G. W73-02431

CONTROL OF AQUATIC VEGETATION IN FRESHWATER, Department of the Interior, Washington, D.C. Office of Library Services.

fice of Library Services.

P. A. Skaptason.

Available from the National Technical Information Service as PB-208 527, \$3.00 in paper copy, \$9.95 in microfiche. Bibliography Series No 28, March 1972. 208 p. 851 ref.

Descriptors: *Aquatic weed control, *Aquatic weeds, *Freshwater, *Bibliographies, Chemcontrol, Biccontrol, Herbicides, Aquatic plants, Pesticides, Varieties, Economics, Geographical regions, Water pollution effects, Regulation, Safety, Research and development, Methodology, Programs.

Among the factors damaging the aquatic habitat in many areas of the United States, careless introduction of foreign plant species has created serious problems. These introduced species, often not detrimental in their native homes, multiply, when placed with no natural enemies, to the point when placed with no natural enemies, to the point where they become pests and injure the aquatic community. This bibliography concerns freshwater plants, considered aquatic weeds, in need of control, and covers literature published from 1966 through early 1971. The material has been limited to English language multications or translations. to English language publications, or translations into English, which stress control of these problem plants. Citations include material on chemical, biological, mechanical and ecological control of aquatic weeds. Ecological and taxonomic articles have been avoided. Publications about pests of particular crop situations, such as cranberry bogs and rice paddies, are omitted. Publications meant for local use only are also avoided. The compila-tion includes indexes for author, subject, aquatic bon includes indexes for author, subject, aquatic plants, herbicides with numbers referring to the citations in the bibliography. Both plant and herbi-cide terminology is verified by authorative sources listed in the section entitled 'Major Sources Consulted.' (Jones-Wisconsin) W73-02448

MARINE AIDS TO NAVIGATION - SELECTION

AND DESIGN, Coast Guard District (13th), Seattle, Wash, Civil Engineering Branch. bibliographic entry see Field 05C.

RE-EVALUATION OF THE RELATIONSHIP OF MASTER STREAMS AND DRAINAGE BASINS, Texas Univ., El Paso. Dept. of Geological For primary bibliographic entry see Field 02J. W73-02488

SAINT CATHERINE SOUND, MARYLAND (MAINTENANCE DREDGING) (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as EIS-MO-72-4563-F, \$3.50 in paper copy, \$0.95 in microfiche. May 31, 1972. 27 p, 2 map, 1 tab.

Descriptors: "Maryland, "Environmental effects, "Channel improvement, "Dredging, Channels, Channeling, Rivers, Sounds, Excavation, Transportation, Inland waterways, Navigation, Turbidity, Benthic fauna, Aquatic environment, Spoil

sy, beautic annual Aquatic environment, Spon-banks, Boating. Identifiers: *Environmental Impact Statements, *Saint Catherine Sound (Md), Wicomico River

The proposed project in the Saint Catherine Sound, Maryland, consists of dredging in order to maintain the six-foot-deep, 80-foot-wide naviga-tion channel extending 3,330 feet into the tion channel extending 3,330 feet into the Wicomico River at the northern end of the Sound. Two small segments of the channel at the southern end of the Sound, totalling 700 feet long and 100 feet wide, will not be maintained at this time. Dredged material will be disposed of on a mainland site adjacent to the upper entrance channel. The project will maintain the channel for commercial fisheries interests and recreational boating.

Adverse environmental effects include the removal or disturbance of benthic organisms such as oysters and clams, the disturbance of pelagic organisms such as fish and blue crabs, and a temporary increase in turbidity. Alternatives are to forego further maintenance or to use alternate methods of dredging and disposal. (Wheeler-Florida)

MIAMI HARBOR, FLORIDA, NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATE-

Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A. W73-02517

BALTIMORE HARBOR OUTER CROSSING (PATAPSCO RIVER BRIDGE) BALTIMORE, MARYLAND (FINAL ENVIRONMENTAL IM-PACT STATEMENT).

Coast Guard, Washington, D.C. For primary bibliographic entry see Field 08A. W73-02518

UNIT PLAN FOR MANAGEMENT OF THE HIWASSEE UNIT, CHEROKEE NATIONAL FOREST, TENNESSEE (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Cherokee National Forest, Cleveland, Tenn. For primary bibliographic entry see Field 04D. W73-02519

NEWHALL, SAUGUS AND VICINITY, LOS ANGELES COUNTY, SANTA CLARA RIVER AND

TRIBUTARIES, CALIFORNIA (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 08A. W73-02521

CURRY CREEK RESERVOIR, NOI OCONEE RIVER, GEORGIA (DRAFT VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Savannah, Ga. For primary bibliographic entry see Field 08A. W73-02523 NORTH

CLINCHFIELD DAM AND RESERVOIR, BROAD RIVER BASIN, NORTH CAROLINA AND SOUTH CAROLINA (DRAFT ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District, Charleston, S.C. For primary bibliographic entry see Field 08D. W73-02524

MODELING AND SENSITIVITY ANALYSIS FOR PLANNING DECISIONS IN WATER RESOURCES EXPANSION,

Texas Univ., Austin. Dept. of Chemical Engineering.
D. T. O'Laoghaire, and D. M. Himmelblan.

Pulletin American

Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 653-668, August 1972. 1 fig, 5 tab, 16 equ, 23 ref. OWRR-C-3020 (No 3673) (1).

Descriptors: Water resources development,
*Reservoirs, Costs, *Mathematical models,
*River basins, *Planning, Capital, *Investment,
*Algorithms, Equations, Operations research,
*Decision making, Constraints, Canals, Streams,
Synthetic hydrology, Water demand, Flow, Dams.
Identifiers: *Sensitivity analysis, Integer pro-Identifiers: "Sensitivity analysis, Integer programming, Water resources expansion, Branch and bound algorithm, Network analysis, System operating rules, Treatment plants.

The value of examining the sensitivity of the out-puts and constraints of a water resources system model to input and parameter variations in making decisions regarding expansion, particularly with respect to the construction of reservoirs that require large investments is discussed. The applicability of an algorithm previously applied the deterministic river basin expansion problem is extended to include the feature of a sensitivity analysis. The algorithm contains a partial enumeration search technique and a network analysis code; it gives a construction sequence of reservoirs, canals, and treatment plants, and an operatvons, tantas, and treatment pants, and in operating policy that maximizes the present value of net earnings consistent with certain underlying assumptions. A river basin was chosen that had an existing configuration of unregulated streams and rivers, reservoirs, canals and treatment plants, and sites for future additional facilities. Sensitivity study results show that the immediate planning decision of what facility to construct next is insenquecision or what facility to construct next is insensitive to variations in future demands and costs and independent of later decisions. Thus, decision making is adaptive in the sense that by always making the optimal proximate decision, the management of the river basin is optimized. (Bell-Cornell)
W73-02541

PRELIMINARY ANALYSIS OF SURFACE WATER AVAILABILITY, Saskatchewan-Nelson Basin Board, Regina.

International Association for Hydraulic Research, No 415, Presented in Paris, France, August 1971. 10 p, 8 fig, 5 ref.

Descriptors: *Canada, *Project planning, *Costs, *Reservoir operation, *Storage, *Diversion, Water supply, Water resources, Simulation analy-

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control of Water on the Surface

sis, Dynamic programming, Linear programming, Mass curves, Model studies, Systems analysis, Computers, Constraints, Algorithms, Streamflow, Reservoir yield, Meteorological data, River

systems.
Identifiers: Alberta, Manitoba, Saskatchewan,
Water availability, Multireservoir analysis, Data
banks, Storage-yield curves, Network analysis,
Hydrometric stations.

The Saskatchewan-Nelson Basin Study is a four-year mission (1968-72) to analyze water availability and associated costs as a first step in overall water resources planning in the geographical area comprising the settled portion of Canada between the Rocky Mountains and the Great Lakes, plus potential diversions from the large rivers to the north. The modelling techniques being used in the systems analysis of the network of rivers and exsystems analysis of the network of rivers and ex-isting and proposed projects for storage and diver-sion are discussed (dynamic programming, mass curve analysis, linear programming, and simula-tion); the advantages and limitations of each technique and the manner in which the various techniques are interrelated are described. The study considers potential additional supply by diversion or storage and the feasibility and cost of alternative combinations of storage and/or diversion works necessary for provision of a firm water supply of varying amounts and with varying control of a firm water and the state of supply of varying amounts and with varying seasonal distributions at various selected points. The keys to success in this type of multireservoir alysis are: (1) carefully created data banks at different levels; (2) flexible and fully general models; (3) a hierarchy of models of different types; and (4) a final versatile general-purpose multireservoir simulation model. (Bell-Cornell)

OBSERVATIONS OF DECLINING WATER LETFUCE POPULATIONS IN LAKE IZABAL, GUATEMALA, Florida Univ., Gainesville. Dept. of Plant Patholo-

For primary bibliographic entry see Field 02H. W73-02549

OBJECTIVES OF WATER RESOURCE MANAGEMENT - CAN THEY BE ACHIEVED THROUGH LEGISLATION,
Oregon State Univ., Corvallis. School of Business

and Technology.
For primary bibliographic entry see Field 06E.
W73-02561

PONDEROSA PINE PLANTING TECHNIQUES, SURVIVAL AND HEIGHT GROWTH IN THE IDAHO BATHOLITH, Forest Service (USDA), Ogden, Utah. Intermoun-tain Forest and Range Experiment Station.

D.O. Hall.

U. S For Serv Res Pap Int. 104. p 1-28, 1971. Illus. Identifiers: *Growth (trees), Height, Herbicides, *Idaho batholith, Mammals, Mulch, Physocarpus malvaceus, Pine-G, Planting, Techniques, *Ponderosa pine, Pseudotsuga menziesii G, Soils, Survival, Temperature.

Site preparation and mulching tests were carried out on some steep slopes having shallow soils in the Douglas-fir-Ninebark (Pseudotsuga menziesii-Physocarpus malvaceus) habitat type on the Boise and Payette National Forests. Treatments inand rayette vational rorests. Ireatments in-cluded: (A) hand scalping; (B) a herbicide; (C) spot buring; (D) periodic had weeding; (E) straw mulch; (F) black plastic film mulch; and (G) glass fiber mulch. Other natural variables recognized were: aspects; soil depth; moisture relations; summer rainfall; temperatures above undisturbed vegetation and above surfaces of treatments D, F and G. Survival and 5-yr height growth of the outplanted 2-0 nursery stock were measured. Extensive mammal damage was noted and appeared to be indirectly correlated with soil depth. All treatments increased seedling survival. Combining hand scalping and herbicide was effective. Height growth was positively correlated with plot survival percent and soil depth. Trees were tallest where black plastic film was used and on SE aspects; such growth was probably related to the influence of warmer temperatures.—Copyright 1972, Biological Abstracts, Inc. W73-02579

THE PONDS OF THE SOIGNES FOREST,

Nat Belg. Vol 52, No 4, p 177-193, 1971. Illus. Identifiers: *Belgium, Forests, *Odonata, Ponds, *Soignes Forest.

The cold, special biotopes of the Soignes Forest (located south of Brussels, Belgium) have furnished zoologists and entomologists with interesting discoveries in the past. One pond (the Ermite pond) for example, is known as the habitat of most of the Odonata of central Belgium. Many of these ponds have been artificially maintained by of these ponds have been artificially maintained by the use of dikes and retaining walls, but are now in great danger due to drying of the subterranean water layer (due to pumping stations in the area), to pollution due to vandalism and lack of civic interest, and to expansion of the highway network. They are in urgent need of protection.—Copyright 1972, Biological Abstracts, Inc.

W73-02593

ECOLOGY OF JALORE DISTRICT IN WESTERN RAJASTHAN, Central Arid Zone Research Inst., Jodhpur (India). R. K. Gupta, and S. K. Sexena. J Indian Bot Soc. Vol 50, No 3, p 237-246. 1972. Il-

Identifiers: Climate, Ecology, Forest, Halophytic, *India, *Jalore (Rajasthan), Scrub, Soils, Thorns, *Vegetation.

Environmental factors like the climate, soils and biotic features were given. The vegetation has been mainly classified into spinous formations, edaphic formations and psammophytic scrub for-mations. These formations have been sub-classified as desert thorn forest on low and medium altitudes (hills and sand dunes), mixed xeromorphic thorn forests on the plains, riverain thorn forest on riverbeds, halophytic scrub on shallow, saline depressions, psammophytic scrub formations on medium and low sand dunes and hummocks.—Copyright 1972, Biological Abstracts, Inc. W73-02600

4B. Groundwater Management

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS, Georgia Univ., Athens. Dept. of Geology. For primary bibliographic entry see Field 02F. W73-01955

A RE-EXAMINATION OF THE COMMON POOL PROBLEM, Louisiana Water Resources Research Inst., Baton

Available from the National Technical Informa-tion Service as PB-213 191, \$3.00 in paper copy, \$0.95 in microfiche. Completion Report, October 31, 1972. 18 p, 3 fig, 2 ref. OWRR A-018-LA (1) 14-31-0001-3018.

Descriptors: *Tax rates, Costs, *Water wells, Cost comparisons, *Cost allocation, Pumping, Cost-benefit analysis. Identifiers: *Common pool problem, *Pumpage

tax, Social costs, *Groundwater economics.

A well field drawing from an aquifer that is replenished by a lake or perennial stream is in a steady-state condition, provided that the aquifer is never dewatered no matter how long pumping continues. An economic problem, the common pool problem, is more complex than heretofore recognized for, although the private costs for any well fail to recognize the interference it causes to other wells, the interference of other wells is reflected in the costs of the first well. The excess of marginal social costs over marginal private costs can be corrected (to equate the two) by a pumpage tax on each well that is proportionate to the socially optimal offtake from other wells. The appropriate tax rate can only be determined by trial and error. (Kazmann-Louisiana State University) W73-01956

RECHARGE TO GROUND WATER FROM THE

RECHARGE TO GROUND WATER FROM THE WEST NISHNABOTNA RIVER, Iowa State Univ., Ames. Dept. of Earth Sciences. R. Stone, and L. V. A. Sendlein. Iowa Academy of Science Proceedings, Vol 77, p 282-289, 1970. 2 fig, 3 tab, 7 ref.

Descriptors: *Groundwater recharge, *Water John S. Toundwater recharge, "Water balance, "Streamflow, "Base flow, "Gow, Groundwater, Withdrawal, Hydrologic budget, Hydrologic data, Low flow, Runoff. Identifiers: "West Nishnabotna River.

Surface water budgets, calculated from base-flow discharge data, for several reaches of the West Nishnabotna River in southwest Iowa, reveal two reaches with anomalously small incremental discharges. These small incremental discharges cannot be accounted for through evapotranspira-tion at the time of the discharge measurements nor can they be related to losses associated with shalcan they be related to losses associated with shal-low groundwater withdrawals near the river. The small incremental discharges in the two reaches are interpreted as resulting from influent condi-tions at natural groundwater recharge sites within each reach. The southernmost of these two sites is located near a major buried valley which may be conducting the influent river water into the subsur-face away from the river. (Woodard-USGS) W73-02033

CHEMICAL ANALYSES OF WATER FROM WELLS IN HARRIS COUNTY, TEXAS, 1922-71, Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W73-02038

WATER TABLE FLUCTUATIONS IN THE MEERUT DISTRICT, UTTAR PRADESH, IN-DIA, Banaras Hindu Univ., Varanasi, (India). Dept. of

Geography. R. N. Mathur.

Geografiska Annaler, Vol 52A, No 1, p 76-85, 1970. 4 fig. 4 tab, 3 ref.

Descriptors: *Water level fluctuations, *Water ta-ble, *Withdrawal, *Safe yield, Water yield, Irriga-tion water, Groundwater resources, Water resources development, Groundwater availability, Water supply, Water balance. Identifiers: *Meerut (Uttar Pradesh, India), *In-

The groundwater in the Meerut district, India, or curs under water-table conditions. The form of the water table clearly reflects the control of surface relief. The water-table fluctuations in any year are caused by variations in local rainfall and tube-well caused by variations in local rainfall and tube-well pumping. The fluctuations in the areas outside tube-well irrigation (also including areas under canal irrigation) are entirely controlled by variations in local rainfall and they do not exhibit any marked areal variations. Fluctuations even in the tube-well areas broadly resemble those in the areas outside tube-well irrigation, because the

fluctuations o fluctuations of perimposed fluctuations. rainfall recha-rigation, obta-and by com-show a good fluctuations of the Daha are well areas in decline due to progressive of completely consucceeding be succeeding he ing that the im area, is within W73-02044

GROUND-W SON, CHER DERSON CO Guyton (Willi For primary b W73-02049

CONTROL OF GROUN Michigan Te of Civil Engir For primary W73-02111

Missouri Wa For primary 1 W73-02113

SALT POLL

A WATER
JUNCTIVE
SYSTEM: AP Florida Univ tal Engineeri For primary W73-02178

LEADING C (FINAL EN MENT). Economic D III. Midweste For primary | W73-02267

CHEMICAL OBSERVATI AND ASSO TONIO ARE Geological S For primary W73-02307

RECORDS HEAD, AND THE ED -1968. Geological S For primary W73-02308

A SHALLO TERTIARY YORK PENI Geological S K. G. Grimes Queensland No 848, p 24

WATER QUANTITY MANAGEMENT AND CONTROL-Field 04

Groundwater Management-Group 4B

fluctuations due to the tube-well pumping are superimposed upon the more prominent seasonal fluctuations. The values for water table rise due to rainfall recharge in the areas outside tube-well irrigation, obtained from direct well measurements and by computation from water balance data, show a good correspondence. The water table fluctuations due to pumping are clearly apparent in the Daha area in any year and in all of the tube-well areas in a low-rainfall year. A water table decline due to pumping in a drought period is completely compensated by rainfall recharge in succeeding heavy-rainfall years, thereby indicating that the intensity of pumping, even in the Daha area, is within safe limits. (Knapp-USGS)

GROUND-WATER CONDITIONS IN ANDER-SON, CHEROKEE, FREESTONE, AND HEN-DERSON COUNTIES, TEXAS. Guyton (William F.) and Associates, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02049

CONTROL OF NITRATE CONTAMINATION CONTROL OF ARRATE ASSOCIATED WITH LAND DISPOSAL OF MUNICIPAL SEWAGE, Michigan Technological Univ., Houghton. Dept. of Civil Engineering.

For primary bibliographic entry see Field 05B. W73-02111

SALT POLLUTION OF GROUND WATER, Missouri Water Resources Research Center, Rol-

For primary bibliographic entry see Field 05B. W73-02113

A WATER QUALITY MODEL FOR A CON-JUNCTIVE SURFACE-GROUNDWATER SYSTEM: AN OVERVIEW, Florida Univ., Gainesville. Dept. of Environmen-For primary bibliographic entry see Field 05B.
W73-02178

LEADING CREEK CONSERVANCY DISTRICT (FINAL ENVIRONMENTAL IMPACT STATE-MENT). Economic Development Administration, Chicago,

Ill. Midwestern Region.

For primary bibliographic entry see Field 05F.

W73-02267

CHEMICAL ANALYSES OF WATER FROM OBSERVATION WELLS IN THE EDWARDS AND ASSOCIATED LIMESTONES, SAN AN-TONIO AREA, TEXAS, 1967. Geological Survey, San Antonio, Tex. For primary bibliographic entry see Field 02K. W73-02307.

RECORDS OF PRECIPITATION, AQUIFER HEAD, AND GROUND-WATER RECHARGE TO THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS,-

Joseph Geological Survey, San Antonio, Tex. For primary bibliographic entry see Field 02F. W73-02308

A SHALLOW ARTESIAN AQUIFER IN THE TERTIARY DEPOSITS OF SOUTHERN CAPE YORK PENINSULA, Geological Survey of Queensland, Brisbane (Aus-

K. G. Grimes

Queensland Government Mining Journal, Vol 73, No 848, p 247-249, June 1972. 2 fig, 1 tab, 4 ref.

Descriptors: "Australia, "Artesian aquifers, "Artesian wells, "Groundwater resources, Water resources development, Hydrogeology, Water yield, Water quality, Identifiers: "Queensland (Australia).

Identifiers: *Queensland (Australia).

A confined (artesian) aquifer was found within the Upper Cretaceous to lower Tertiary Bulimba Formation in the vicinity of Dunbar Station, southwestern Cape York Peninsula, Australia. The aquifer is a sandy sequence within the Bulimba Formation. This formation is a continental unit of early Tertiary and possible late Cretaceous age found along most of the western side of Cape York Peninsula and presumably extending westward beneath the Gulf of Carpentaria. It is more than 400 feet thick in the Dunbar area, but elsewhere it is generally about 200 feet thick. The Formation is composed mainly of claystones, with less abundant quartzose sandstones and minor granule conglomerates. A laterite horizon is developed in its upper part. The depth to the aquifer increases from east to west in the Dunbar area and, if it reaches the Gulf coast, extrapolation suggests that it would be at a depth of 650 feet in that area. The most likely intake area is to the northeast, where the Bulimba Formation crops out west of the Great Dividing Range. Water analyses from the two Bureau of Mine Resources holes and from one of the bores show that the water is of excellent quality. (Knapp-USGS)

RADIOISOTOPE INVESTIGATION TECHNIQUES IN ENGINEERING GEOLOGY AND HYDROGEOLOGY (RADIOIZOTOPNYYE METODY ISSLEDOVANIYA V INZHENERNOY GEOLOGII I GIDROGEOLOGII),
All-Union Scientific Research Inst. of
Hydrogeology and Engineering Geology, Moscow
(USSR).

For primary bibliographic entry see Field 08G. W73-02328

FINITE ELEMENT ANALYSIS OF FLOW TOWARD ARTESIAN WELL, Kentucky Univ., Lexington. Dept. of Civil En-For primary bibliographic entry see Field 02F. W73-02340 incering.

COLLECTED REPRINTS, VOLUME II 1969--1970. Hawaii Univ., Honolulu. Water Resources

1971, 205 P. OWRR A-999-HI (7).

Descriptors: Water yield improvement, Sugar-cane, Thermodynamics, Hydrogeology, Soils, Photography, Flood hydrology, Small watersheds, Desalination, Water supply, Consumptive use, Radiation, Groundwater, Volcances, *Hawaii, Water balance, Infrared, Well logging, Basalts, Aquifers, Mapping, Lava, Resistivity. Waste water treatment.

Fifteen articles contributed by the faculty associated with the Water Resources Research Center, University of Hawaii, to various profes-Center, University of Hawan, to various professional journals or presented at symposis and conferences and published in the proceedings of such meetings are compiled. The articles were published between 1969 and 1970 and are concerned with some aspects of hydrology related sciences and the societal and ecological effects of the enhancement or pollution of water and water resources. W73-02347

MAINTAINING WATER WELL YIELD, Universal Oil Products, St. Paul, Minn. Johnson For primary bibliographic entry see Field 08G. W73-02369

WATER WELL HYDRAULICS, Universal Oil Products, St. Paul, Minn. Johnson For primary bibliographic entry see Field 08B.

THE ELECTRIC LOG: GEOPHYSICS' CONTRIBUTION TO GROUND WATER PROSPECTING AND EVALUATION,

H. J. Hansen.

Maryland Geological Survey Information Circular
No 4, 1967. 11 p, 4 fig, 7 ref.

Descriptors: Logging (Recording), *Electrical well logging, Resistivity, Water wells, *Ground water availability, Exploration, Sampling, Geophysics. Identifiers: Self potential logging, *Groundwater

The use of self potential (SP) and resistivity logs to The use of self potential (SP) and resistivity logs to locate water bearing formations is explained. A brief history of electrical well logging, with special reference to the ground water industry, is given. The fact that electric logs can contribute importantly to the efficient design and construction of individual wells is emphasized. The further ability of electric logs to correlate aquifers from place to place is also noted, along with the fact that other methods of sampling and exploration must be used to supplement the electric log. (Campbell-NWWA) W73-02373

INITIATION OF GROUND-WATER FLOW IN JOINTED LIMESTONE,

National Speleological Society Bulletin, Vol 28, No 3, p 111-118, July, 1966. 4 fig. 14 ref.

Descriptors: *Groundwater *Limestones, *Joints (Geologic), Caves, Car-bonate rocks, Faults (Geologic), Tidal effects.

The earliest stages of solution along joints in carbonate rock are studied. A hypothesis is formulated to explain observed features in the rock: Joints adjacent to existing bodies of water (surface or subsurface) are affected by differential movement along the joint surfaces. The main effect is to pump water in and out of the joint and start incipient solution. Once solution enlarges the joint, the water is diverted from the surrounding rocks so that the zone of most active flow. one water is diverted from the surrounding rocks so that the zone of most active flow, and presumably the zone of most active solution, will follow the headward advance of the solution opening. (Campbell-NWWA)

W73-02375

NOTES ON THE EARLY HISTORY OF WATER--WELL DRILLING IN THE UNITED STATES, For primary bibliographic entry see Field 08B. W73-02376

COMPOSITIONAL LOGGING OF -DRILLED WELLS, Gulf Research and Development Co., Pittsburgh, For primary bibliographic entry see Field 08B.

HYDRAULICS OF WELLS. Baghdad Univ. (Iraq). Coll. of Engineering. For primary bibliographic entry see Field 08B. W73-02378

A PORTABLE AIRLINE TO MEASURE WATER LEVEL, For primary bibliographic entry see Field 07B. W73-02382

YIELDS OF DEEP SANDSTONE WELLS IN ORTHERN ILLINOIS, Illinois State Water Survey, Urbana.

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4B—Groundwater Management

For primary bibliographic entry see Field 03B. W73-02386

EFFECT OF WELL SCREENS ON FLOW INTO WELLS, Missouri Univ., Columbia. For primary bibliographic entry see Field 08B. W73-02389

BOUNDARY FLOW CONSIDERATIONS IN THE DESIGN OF WELLS, Ain Shams Univ., Cairo (Egypt). Faculty of Engineering. For primary bibliographic entry see Field 08B.

YIELDS OF SHALLOW DOLOMITE WELLS IN NORTHERN ILLINOIS, Illinois State Water Survey, Urbana. S. Csallany, and W. C. Walton. Illinois State Water Survey, Report of Investiga-tion 46, 1963. 43 p, 31 fig, 6 tab, 16 ref.

Descriptors: *Illinois, Regional analysis, Dolomite, *Aquifer characteristics, Reservoir yield, *Water wells, Water supply, Glacial drift, Aquifer testing, Faults (Geologic), Specific capacity.
Identifiers: *Consolidated aquifers, Acid treatment, Silurian rocks, Ordovician rocks, *Well

In northern Illinois large quantities of ground water are withdrawn from wells in shallow dolomite aquifers of Silurain and Ordovician age. About 1000 well-production tests were made, P321-1961, on more than 800 shallow dolomite wells. Statistical analysis of specific-capacity data provided a basis for determining (1) the role of individual shallow dolomite aquifers of formations, provided a basis for determining (1) the role of individual shallow dolomite aquifers of formations, uncased in wells, as contributors of water; (2) whether or not significant relationships exist between the yields of wells and geohydrologic controls; and (3) the effects of acid treatment on the productivities of wells. The Niagaran Series, Alexandrian Series, and Galena-Platteville Dolomite all have similar moderate to high yields and inconsistency of yields in areas throughout northern Illinois where these rocks directly underlie glacial drift. These Silurian and Ordovician rocks have similar low yields and inconsistency of yields in areas where these rocks are overlain by bedrock. On the other hand, the Maquoketa Formation and rocks of Devonian age yield very little water to wells. Highest yielding wells are found in bedrock upland areas, in areas where the glacial drift immediately overlying the shallow dolomite aquifers is composed of sand and gravel, and in areas where reefs and associated strata are present. (Campbell-NWWA)

YIELDS OF WELLS IN PENNSYLVANIAN AND MISSISSIPPIAN ROCKS IN ILLINOIS, Illinois State Water Survey, Urbana.

Illinois State Water Survey, Report of Investiga-tion, 1966. 43 p, 28 ref, 25 fig, 12 tab, 3 app.

Descriptors: *Illinois, *Water wells, Limestones, Sandstones, Carbonate rocks, *Aquifer testing, Reservoir yield, Specific capacity, Water supply, Water resources.
Identifiers: *Consolidated aquifers, Mississippian rocks, Pennsylvanian rocks, Shooting (Blasting), *Well yield.

During the period 1920 to 1963 about 250 well-production tests were made on more than 200 wells penetrating Pennsylvanian and Mississippian rocks. Statistical analysis of specific-capacity data provided a basis for comparing the productivity of individual formations. It is concluded that the average productivity of the Keokuk-Burlington

Formation is greater than the average productivity of the Ste. Genevieve-St. Louis-Salem-Warsaw Formations and Chesterian Series of Mississippian age. The average productivity of the Keokuk-Burlington Formation of Mississippian age is greater than the productivity of Pennsylvanian rocks. The median specific capacities of wells in Pennsylvanian rocks and in the Keokuk-Burlington, Chesterian and Ste. Genevieve-St. Louis-Salem-Warsaw are 0.32, 1.02 0.30, and 0.12 gallons per minute per foot of drawdown (gpm/ft), respectively. The average productivity of Pennsylvanian and Mississippian rocks is much less than that of Silurian and Ordovician rocks in northern Illinois. Several wells show marked improvement in yield as the result of shooting. Yields are increased because (1) the hole is enlarged and (2) fine materials and incrusting deposits on the well face and in the well wall are removed. (Campbell-NWWA) W73-02400

THE USE OF ACOUSTIC LOGS IN THE EVALUATION OF SANDSTONE RESERVOIRS, Shell Development Co., Houston, Tex. Explora-tion and Production Research Div. For primary bibliographic entry see Field 08G. W73-02401

ELECTRIC LOGGING APPLIED TO GROUND WATER EXPLORATION, Geological Survey, Baton Rouge, La. Ground Water Branch. For primary bibliographic entry see Field 08G.

W73-02402

INTERPRETATION OF TEMPERATURE LOGS IN WATER- AND GAS-INJECTION WELLS AND GAS-PRODUCING WELLS. Bird Well Surveys, Bradford, Pa. For primary bibliographic entry see Field 08G. W73-02405

TESTING FOR AND THE DEVELOPMENT OF GROUND WATER SUPPLIES, Maher (D. L.) Co., Woburn, Mass.

E. J. Maher. Journal of the New England Water Works Association, Vol 80, No 4, p 326-330, December,

Descriptors: *Water wells, Unconsolidated aquifers, *Test wells, Well screens, Pump testing, *New England, Gravels, Lithologic logs, *Sampling, Specific capacity.

Identifiers: *Well points, Large diameter wells, *Well device the screen weeked *Well device the screen well device the screen well device the screen well deviced the screen well as the scre Pull-down method, *Well development, Fines (Particles), Well logs.

A procedure for constructing and evaluating test wells, and for drilling and developing permanent wells based on the performance of the test wells is outlined. The keeping of test well logs for the evaluation of subsurface water-bearing strata is recommended. Factors to be considered in the design of the permanent well are: the depth, the anticipated yield in gallons per foot of draw-down, the desired capacity, the size of the sand and gravel, and the thickness of the water bearing strata. (Campbell-NWWA) W73-02412

WATER WELLS AND GROUND WATER CON-TAMINATION, Bureau of Reclamation, Denver, Colo. For primary bibliographic entry see Field 05B.

W73-02413

WATER SUPPLY SOURCES FOR THE FARM-STEAD AND RURAL HOME.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 Price \$0.15. Department of Agriculture, Farmers' Bulletin 2237, 1971. 18 p.

Descriptors: Water supply, Water demand, Water quality, Wells, *Rural areas, *Surface water availability, *Groundwater availability, Disinfection, Construction, Cisterns, Dug wells, Livestock, Hardness (Water), Hydrologic cycle. Identifiers: Jetted wells, *Contamination, Bored wells, Driven wells, *Farm water supplies.

Both groundwater and surface water sources for water supply for the rural home are examined. Groundwater sources, with less likelihood of con-tamination as opposed to surface water sources, are preferred. Methods of obtaining groundwater are from wells and springs. Types of wells discussed are dug, bored, driven, drilled, and jetted wells. Sanitary procedures to be followed in petted wells. Samtary procedures to be followed in well installation are described. Surface water sources are ponds, lakes, streams, irrigation ditches, and cisterns. Proper construction and sanitation for each are emphasized. (Campbell-NWWA) W73-02418

LOG INTERPRETATIONS IN SANDSTONE

RESERVOIRS, Gulf Research and Development Co., Pittsburgh, Pa. M. R. J. Wyllie.

Geophysics, Vol 25, No 4, p 748-778, August, 1960. 13 fig.

Descriptors: *Logging (Recording), *Sandstones, *Aquifer characteristics, Oil industry, Exploration, Resistivity, Porosity.
Identifiers: *Saturated zones, Interstitial fluids, *Sandstone reservoirs, Formation resistivity, SP

By comparison with carbonate rocks, sandstones By comparison with carbonate rocks, sandstones are texturally homogeneous; in consequence their interpretation from well logs is relatively simple. Some of the principal difficulties involved in determining interstitial water resistivity, prosity, and formation resistivity are examined. Measurements on the effect of the porosity of sandstones on the difference between velocities through them when dry and fully water saturated show that the velocity difference is at a maximum when the proposity is at a minimum. A high preventage of velocity difference is at a maximum when the porosity is at a minimum. A high percentage of sandstones could be interpreted qualitatively; whether rigorous quantitative interpretation will ever be really required in questioned. (Campbell-NWWA).
W73-02423

WELL LOGS IN CARBONATE RESERVOIRS, L. G. Chombart.

Geophysics, Vol 25, No 4, p 779-853, August, 1960. 23 fig.

Descriptors: Logging (Recording), *Aquifer characteristics, Exploration, Core drilling, Core logging, Rock properties, Sampling, Porosity, *Reservoir yield, Carbonate rocks, Lithogic logs, *Volumetric analysis, Oil industry, Identifiers: Pore structure, *Geophysical studies.

The volumetric evaluation of a carbonate reservoir is more expensive, and requires more time and effort, than that of a sandstone reservoir of com-parable size and merit. The method of evaluation paranie size and ment. Inc method of evaluation is outlined. Cuttings of cores are first described as to rock types and depths. Techniques which establish relationships between pore size distribution, porosity and water saturation on a statistical basis, such as the use of 'focusing' tools, are recommended. The reservoir is then recommended to cores sub-petrophys-logs run ai (Campbell W73-0242

GROUND TRANSFO OF A NE Arizona V For prima: W73-0243

GROUND TRANSFO AND MA Arizona U Engineeri For prima W73-0243

EVALUA' SYSTEM WATER, Engineeri For prima W73-0244 GEOPHY

GEOCHE

LUKE SA

Geologica

For prima W73-0248 WATER California J. J. Dood Ground V 13-15, Sp

Descripto *Ground mands, models, sis, Cost water, resource Identifier

Describe series of Departm surface v

the majo

managen tial. The informat managen ground required meeting stantly vestigation with loc Benefits in the U agencies facilities from the \$2,000,0 cal mod dynamic various

WATER QUANTITY MANAGEMENT AND CONTROL—Field 04

Watershed Protection—Group 4D

mended to be cored and logged in key wells, the cores subjected to capillary pressure and other petrophysical tests, and all potentially diagnostic logs run and analyzed in the light of all other data. (Campbell-NWWA) W73-02424

GROUNDWATER RECHARGE AND QUALITY GROUNDWALER RELEARED AND QUALITY TRANSFORMATIONS DURING INITIATION OF A NEW SEWACE STABILIZATION POND (AND MANAGEMENT), Arizona Water Resources Research Center, Tuc-

For primary bibliographic entry see Field 05B. W73-02438

GROUNDWATER RECHARGE AND QUALITY TRANSFORMATIONS DURING INITIATION AND MANAGEMENT OF A NEW STABILIZA-TION LAGOON, Arizona Univ., Tucson. Dept. of Soils, Water and

Engineering. For primary bibliographic entry see Field 05B.

W73-02430

EVALUATION OF A TURFGRASS-SOIL SYSTEM TO UTILIZE AND PURIFY WASTE WATER, Arixona Univ., Tucson, Dept. of Soils, Water and

Engineering. For primary bibliographic entry see Field 05B. W73-02440

GEOPHYSICAL, GEOHYDROLOGICAL, AND GEOCHEMICAL RECONNAISSANCE OF THE LUKE SALT BODY, CENTRAL ARIZONA, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02F. W73-02480

WATER ECONOMICS, California State Dept. of Water Resources, Sacra-

Ground Water Resources Institute, Vol 4, No 1, p 13-15, Spring 1972.

Descriptors: *California, *Conjunctive use, *Groundwater, *Surface waters, *Water demands, *Alternative planning, *Mathematical models, *Operations research, Simulation analysis, Costs, Management, Computers, Imported water, Water distribution (Applied), Water resources.
Identifiers: *Santa Ana River basin (Calif).

Described in detail is the methodology used in a series of studies being conducted by California's Department on the conjunctive use of ground and surface waters. Since the cost of imported water is the major economic factor in southern California, the major economic ractor in southern Cambornas, the difference between efficient and inefficient management of water resources could be substantial. The studies develop operational and economic information, covering a wide range of alternative management plans, in order to coordinate both ground and surface water resources and their required facilities, for use by local agencies in meeting Southern California's fluctuating but conmeeting Southert Camorina's studiusing out con-stantly increasing water demands. Current in-vestigations are being done on a cooperative basis with local agencies under a cost-sharing plan. Benefits of these efforts are already being realized in the Upper Santa Ana River Basin, where local in the Upper Santa Ana River Basin, where local agencies have used information from the studies to plan the design and timing of surface distribution facilities for delivering northern California water from the state water project; authorities estimate a \$2,000,000 saving. The purpose of the mathematical model is to provide a tool to simulate the dynamic behavior of the ground water basin under various plans of operation, so that each plan for meeting future water demands may be opera-tionally and economically evaluated. (Bell-Cornell) W73-02543

4C. Effects on Water of Man's Non-Water Activities

NONPARAMETRIC STATISTICAL METHODS IN URBAN HYDROLOGIC RESEARCH, Maryland Univ., College Park. Dept. of Civil En-

R. H. McCuen, and L. D. James.

Water Resources Bulletin, Vol 8, No 5, p 965-975, October 1972. 9 tab, 7 ref.

Descriptors: *Urban hydrology, *Statistical methods, *Rainfall-runoff relationships, Statistics, Urbanization, Urban runoff, Data processing, Data collections, Synthetic hydrology, Mathematical models, Peak discharge, Correlation analysis.
Identifiers: *Statistical methods (Nonparametric).

In urban hydrologic studies, it is often necessary to determine the effect of changes in urban land use patterns on such runoff characteristics as flood peaks and flow volumes. Nonparametric statistical methods have properties that make them valuable tools for detecting hydrologic change caused by a treatment, such as urbanization changes a watershed over a period of time. Several techniques are used for illustrative purposes to analyze the effect of urbanization on 24 years of annual flood peaks for a Louisville, Kentucky watershed. Urbanization increases the central tendency of peaks, but not their dispersion. Peak flows modeled by holding watershed parameters constant also increase because of an upward trend in precipitation. By following the numerical examples and looking up test statistics in referenced sources, these methods can be applied to other situations. (Knapp-USGS) W73-02175

THE FOREST OVERSTORY VEGETATION ON THE MISSOURI RIVER FLOODPLAIN IN NORTH DAKOTA,
North Dakota State Univ., Fargo.

For primary bibliographic entry see Field 04A.

W73-02185

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES
IN THE FORT WORTH, TEXAS,
METROPOLITAN AREA, 1970,
Geological Survey, Austin, Tex. For primary bibliographic entry see Field 07C. W73-02482

WATER TEMPERATURE IN THE STEAMBOAT

DRAINAGE, Forest Service (USDA)., Portland, Oreg. Pacific Northwest Forest and Range Experiment Station. G. W. Brown, G. W. Swank, and J. Rothacher. U. S. For Serv Res Pap Pnw. 119. p 1-17. 1971. Illus. Identifiers: *Drainage, *Logging, Mathematical models, Steamboat drainage, Temperature, Water

Stream temperatures were studied in a drainage in which logging operations were typical of much of the commercial forests on the west slopes of the Cascade Range. Changes in water temperature of tributary streams influenced by various degrees of exposure from logging were measured, and a sim-plified prediction equation was tested.—Copyright 1972, Biological Abstracts, Inc. SOME EFFECTS OF LOGGING AND AS-SOCIATED ROAD CONSTRUCTION ON NORTHERN CALIFORNIA STREAMS, California State Dept. of Fish and Game, Sacra-

Trans Am Fish Soc. Vol 101, No 1, p 1-17, 1972. Il-

Identifiers: *California, Construction, *Logging, *Road construction, *Salmon, Streams, *Trout.

*Road construction, *Salmon, Streams, *Trout.

The effects of logging and associated road construction on 4 California trout and salmon streams were investigated from 1966 through 1969. This study included measurements of streambed sedimentation, water quality, fish food abundance, and stream nursery capacity. Logging was found to be compatible with anadromous fish production when adequate attention was given to stream protection and channel clearance. The carrying capacities for juvenile salmonids of some stream sections were increased when high temperatures, low dissolved 02 concentrations, and adverse sedimentation did not accompany the logging. Extensive use of buildozers on steep slopes for road building and in stream channels during debris removal caused excessive streambed sedimentation in narrow streams. Sustained logging prolonged adverse conditions in stream and delayed stream recovery. Other aspects of logging on anadromous fish production on the Pacific Coast are discussed.—Copyright 1972, Biological Abstracts, Inc. W73_02573

HYDROLOGIC EFFECTS OF A BUSHFIRE IN A CATCHMENT IN SOUTHEASTERN NEW SOUTH WALES, Snowy Mountains Engineering Corp., Cooma

Snowy Mo

J. A. H. Brown.

J Hydrol (Amst). Vol 15, No 1, p 77-96, 1972. Illus. Identifiers: *Australia, *Bushfire, *Catchment, Hydrologic effects, New-South-Wales.

An opportunity to study the effect of a bushfire on the hydrology of a forested catchment was presented when a bushfire burned through an area of approximately 280 sq mi in the Snowy Moun-tains region of south-eastern New South Wales, Australia, March 1965. The effect of the fire upon the hydrologic characteristics of 2 catchments for which stream-flow records were avilable before which stream-flow records were aviable before and after the fire was examined and it was shown that: there were pronounced changes in the shape of the flood hydrographs of I catchment, the peak discharge from the other catchment was increased, the amount of runoff from both catchments was much greater in the years follow-ing the fire than it would have been otherwise, and ing the fire than it would have been otherwise, and the aediment loads carried by the streams were greatly increased. After a period of about 4 to 5 yr the catchments appeared to have recovered and their hydrologic characteristics reverted to those prevailing before the fire.—Copyright 1972, Biological Abstracts, Inc.
W73-02589

4D. Watershed Protection

A PROGRAM FOR ESTIMATING RUNOFF FROM INDIANA WATERSHEDS, PART III ANALYSIS OF GEOMORPHOLOGIC DATA AND A DYNAMIC CONTRIBUTING AREA MODEL FOR RUNOFF ESTIMATION, Purdue Univ., Lafayette, Ind. Water Resources Research Center. For primary bibliographic entry see Field 02A. W73-01952

EAGLE-TUMBLEWEED DRAW WATERSHED, NEW MEXICO (DRAFT ENVIRONMENTAL IM-PACT STATEMENT). rvation Service, Washington, D.C.

Field 04-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4D-Watershed Protection

Available from the National Technical Informa-tion Service as PB-208 176D, \$3.00 in paper copy, \$0.95 in microfiche. October 1971. 14 p, 1 map, 1

Descriptors: *New Mexico, *Environmental effects, *Watershed management, *Land management, Watershed Protect. and Flood Prev. Act., Erosion control, Flood control, Water storage, Water utilization, Water zoning, Watersheds (Basins), Floods, Erosion, Stream erosion, Soil conservation, Channelise, Channeling, Flood protection, Irrigation, Irrigation efficiency, Retaining walls, Diversion structures. Identifiers: *Environmental Impact Statements, *Eagle-Tumbleweed Draw Watershed.

The proposed project on the Eagle-Tumbleweed Draw Watershed in Eddy and Chaves Counties, New Mexico, consists of conservation manage-ment and land treatment measures, a floodwater ment and land treatment measures, a floodwater retarding structure, two diversions, and an outlet channel. The principal spillway and retarding storage will provide control of 63 percent (116,000 acres) of the watershed for a storm having a one percent chance of occurrence. The project will result in more efficient use of irrigation water, reduced erosion, increased farm production, and increased food supplies for wildlife. Adverse environmental effects involve the commitment of 1,299 acres of rangeland for the construction and operation of the structural works, and temporary dust and noise during construction. Alternatives operation of the structural works, and temporary dust and noise during construction. Alternatives considered are: no action, land treatment only, channelization, floodproofing, zoning or rezoning, floodwater retarding structures without channels. (Wheeler-Florida)

CHARACTERISTICS OF STRUCTURE AND ANTIEROSIVE ROLE OF ROOT SYSTEMS OF WOODY AND SHRUB SPECIES IN ERODED LANDS OF THE VOLYN-PODOLIAN UPLAND (IN PUSSIAN), For primary bibliographic entry see Field 02I. W73-02055

FORMATION AND CALCULATION OF ELE-MENTS OF THE WATER BALANCE FOR SMALL WATERSHEDS OF NORTHERN KAZAKHSTAN (FORMIROVANIYE I RASCHETY ELEMENTOV VODNOGO BALAN-SA MALYKH VODOSBOROV SEVERNOGO KAZAKHSTANA).

Gosudarstvennyi Gidrologicheskii Institut, Lenin-

For primary bibliographic entry see Field 02A. W73-02065

SUBSURFACE WATER AS A MAJOR FACTOR IN THE FORMATION OF LANDSLIDES ON THE LEFT BANK OF THE CHIRCHIK RIVER (PODZEMRYYE VODY—OSNOVNOY FAKTOR FORMIROVANIYA OPOLZNEY LEVOBE-REZH'YA CHIRCHIKA), Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seigmologii

stitut Seismologii.
For primary bibliographic entry see Field 02J.
W73-02066

SEDIMENT CONTROL, Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 05G. W73-02200

BOXELDER CREEK WATERSHED PROJECT, COLORADO AND WYOMING (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Soil Conservation Service, Washington, D.C.

Available from the National Technical Informa-tion Service as EIS-CO-72-4627-F, \$3.25 in paper

copy, \$0.95 in microfiche. March 1972. 16 p. 1

Descriptors: *Environmental effects, *Flood control, *Soil conservation, *Dam construction, Crops, Stubble mulching, Pasture management, Planting management, Soil management, Range management, Watershed management, Erosion control, Cultivated lands, Flood damage, Flood plains, Watersheds (Basins), Retardance, Sedimentation, Wildlife habitats.

Identifiers: *Environmental Impact Statements, *Boxelder Creek*

*Boxelder Creek

*Boxelder Creek.

The planned project consists of conservation land treatment supplemented by five flood water-reading structures and one grade stabilization structure on the Boxelder Creek Watershed in Colorado and Wyoming. The combination of land treatment and structural measures will reduce erosion and sedimentation in the flood plain. Conservation measures include conservation cropping systems, pasture planting, pasture and range management, stubble mulching and wildlife habitat development. This will improve general farming, range conditions and wildlife habitat. The project will reduce average annual flood damages by about 85 percent. Approximately 200 acres of rangeland will be used to construct dams and spillways. Periodic inundation in the planned floodwater retarding structures will cause adverse effects. Alternatives to the proposed action involved other uses for the flood plain including urban use of range and cropland, less intensive agricultural use and no action. These were rejected as requiring a higher degree of protecton or disrupting the area's agriculturally based economy. (Nielsen-Florida) W73-02235

HAMLIN BEACH STATE PARK COOPERA-HAMLIN BEACH STATE PARK COOPERA-TIVE BEACH EROSION CONTROL PROJECT, LAKE ONTARIO, MONROE COUNTY, NEW YORK (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Buffalo, N.Y. For primary bibliographic entry see Field 08A. W73-02261

SUNRISE SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATE-MENT). Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-206 636D, \$3.00 in paper copy, \$0.95 in microfiche. January 1972. 8 p, 1 map.

Descriptors: *Environmental effects, *Iowa, *Soil conservation, *Gully erosion, Stream stabilization, Flood control, Sheet erosion, Soil erosion, Washouts, Stream erosion, Watershed management, Water control, Slope stability, Sedimentation, Soil stabilization, Check structures, Land management, Soil management.
Identifiers: *Environmental Impact Statements,

*Little Sioux (Iowa).

The proposed project involves the construction of three grade stabilization structures and one vertical inlet on an existing culvert in the Sunrise Sub-watershed, in Woodbury County, Iowa. The project will remove the threat of gully erosion and land destruction to 127 acres of upland and will provide sediment reduction benefits to 330 acres of bottomland. The long term productivity and aesthetics of the area will be enhanced by the treatment of gully systems, sheet erosion and the addition of water areas. Twenty-five acres of variaddition of water areas. Twenty-five acres of vari-ous land uses will be dedicated to structures, pools, and spillways. Wildlife habitats will be lost on 11 acres. 5,000 feet of intermittent stream chan-nel will also be lost. Alternatives considered in-cluded: no project, a system of structural measures only, a land treatment program only, and a combination of land treatment and structural mea-sures. (Beardsley-Florida)

W73-

PON

SUR

Fore tain I For p

05.

P

WAT Georg

DET

TAN MEN Ohio Cent C. R Ava-tion \$0.9

Cen 1972 A-01

Des

Wat cati Ider (Oh Tra

(0.4

low fluo

pro Gre

sho Ti,

peri

pro tra clue sor of

resi

TR WA Rh For W7

PUEBLO DAM AND RESERVOIR, FRYING-PAN-ARKANSAS PROJECT COLORADO (FINAL ENVIRONMENTAL IMPACT STATE-MENT).

Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 08D. W73-02265

SACRAMENTO RIVER BANK PROTECTION PROJECT, CALIFORNIA (DRAFT ENVIRON-MENTAL IMPACT STATEMENT).

Army Engineer District, Sacramento, Calif. For primary bibliographic entry see Field 08D. W73-02266

WATERSHED PROJECT EVALUATION IN-VOLVING MULTIPLE SOCIAL OBJECTIVES, Purdue Univ., West Lafayette, Ind. Dept. of Agricultural Economics. For primary bibliographic entry see Field 06B. W73-02348

UNIT PLAN FOR MANAGEMENT OF THE HIWASSEE UNIT, CHEROKEE NATIONAL FOREST, TENNESSEE (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Cherokee National Forest, Cleveland, Tenn.

Available from the National Technical Information Service as EIS-TN-72-4847-D, \$3.75 in paper copy, \$0.95 in microfiche. June 14, 1972. 33 p, 10

Descriptors: *Tennessee, *Environmental effects, *Forest management, *Watershed management, Land clearing, Reforestation, Land development, Recreation, Fishing, Recreational facilities, Land management, Lumbering, Access roads, Forestry, Lumber, Wildlife conservation, Land use. Identifiers: *Environmental Impact Statements, *Cherokee National Forest (Tenn).

The proposed plan of management for the next 10 years of the Hiwassee Unit of the Cherokee National Forest in Monroe, McMinn, and Polk Counties, Tennessee, consists of selling over 18,000 acres of timber; construction of nine parking areas adjacent to the Hiwassee River; closing approximately 12 miles of primitive roads within the Unit; a deer and trout stocking program; maintaining 47 miles of existing roads and constructing 3 miles of roads, 26 miles of trails, 13.5 miles of jeep roads, and 73 miles of temporary timber access roads. The Unit consists of 39,023 acres of National Forest land. Proper watershed practices involving the location, design, and construction of all roads and recreation areas and good logging practices and recreation areas and good logging practices will be emphasized to improve water quality. Recreational campsites will be maintained. Recreation will be managed by having a primitive area without any man-made developments except a primitive foot trail and a modified area where parking will be allowed. Adverse environmental parking will be allowed. Adverse environmental effects include the visual impact of timber cutting, soil movement from logging activities, and littering. Alternatives are to emphasize the production of timber, to emphasize wildlife production, extensive recreational development along the Hiwasee River and on Starr Mountain, and a balanced production of timber and wildlife with limited recreation development. (Wheeler-Florida) W73-02519

INVESTIGATION OF SLOPE FAILURES IN THE IDAHO BATHOLITH, Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station. For primary bibliographic entry see Field 02J.

W73-02564

PONDEROSA PINE PLANTING TECHNIQUES, SURVIVAL AND HEIGHT GROWTH IN THE IDAHO BATHOLITH, Forest Service (USDA), Ogden, Utah. Intermoun-tain Forest and Range Experiment Station. For primary bibliographic entry see Field 04A. W73-02579

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

TRANSITION METALS OF IMPOUNDED

WATERS, Georgia Inst. of Tech., Atlanta. Environmental Resources Center. For primary bibliographic entry see Field 05B. W73-01953

DETERMINATION OF TRACE METAL POLLU-TANTS IN WATER RESOURCES AND SEDI-MENTS, Ohio State Univ., Columbus. Water Resources

C. R. Cothern.

C. K. Cothern.
Available from the National Technical Informa-tion Service as PB-213 369, \$3.00 in paper copy, \$9.95 in microfiche. Ohio Water Resources Center, Columbus, Completion Report 398X, 1972. 150 p, 42 fig, 20 tab, 162 ref, append. OWRR A-019-OHIO (1) 14-01-0001-3535.

Descriptors: "X-ray fluorescence, "Analytical techniques, "Trace elements, Water analysis, Water chemistry, Water properties, Ion exchange, Sediments, Toxicity, Reviews, Pollutant identification, "Ohio, "Metals.
Identifiers: "Great Miami River (Ohio), Dayton

Trace metals collected in small pore filter paper (0.45 microns) and ion exchange filter paper by allowing samples (300-500 ml) of water to pass through these papers were analyzed by the X-ray fluorescence method. The procedures necessary for the X-ray fluorescence method are described as well as modifications possible for special problem situations. A number of outfalls on the freest Mismi River were sampled over one year. problem situations. A number of outfalls on the Great Miami River were sampled over one year showing the presence of the following metals, Ca, Ti, Cr, Fe, Cu, Zn, Sr, Cd, and Cr. Elements in the periodic table between Ti and Cs were seen to a sensitivity limit of the order of 30 ppb. A computer program for analysing the X-ray fluorescent spectra qualitatively and quantitatively is described, including a calibration scheme. The effects of absorbtion and enhancement are analyzed. A study cuaing a cambration scheme. The effects of aborption and enhancement are analyzed. A study of sediments from the Great Miami River yields results that are similar to normal geological values for the trace metals indicating a low level of pollution in the river. A review is included of the toxilogical effects of trace metals.

W73-01958

TRANSFER OF PESTICIDES THROUGH WATER, SEDIMENTS AND AQUATIC LIFE, Rhode Island Univ., Kingston. For primary bibliographic entry see Field 05B. W73-01959

WATER QUALITY CRITERIA DATA BOOK VOLUME 3: EFFECTS OF CHEMICALS ON AQUATIC LIFE, SELECTED DATA FROM THE LITERATURE THROUGH 1968.

Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 05C.
W73-01976

A SIMPLE APPARATUS FOR MEASURING ACTIVITY PATTERNS OF FISHES, Kansas Univ., Lawrence. H. W. Shirer, J. Cairns, Jr., and W. T. Waller. Water Resources Bulletin, Vol 4, No 3, p 27-43, September 1968. 11 fig, 20 ref. OWRR A-014-KAN (2).

Descriptors: "Toxicity, "Fish behaviro, "Bioas-say, "Zinc, "Research equipment, "Methodology, Laboratory equipment, Fish physiology, Water pollution control, Water quality control, Water uality standards.

lentifiers: *Sublethal effects, *Detection

quality state.
Identifiers: techniques, Goldfish, Golden shiners.

A sizable body of information has accumulated which indicates that waste disposal concentrations which merely permit survival of aquatic organisms may not permit them to function properly. Apmay not permit them to function properly. Apparatus is described which furnishes a quick, relatively inexpensive assessment of the movement patterns of fish using light beam interruption as the sensing means. The suggestion is made that changes in activity might reflect deeper physiological stress. Sublethal concentrations of zinc were shown to alter the movement patterns of goldfish and golden shiners. Unfortunately, there was considerably more individual variation in movement pattern than in a dose-response curve plotting surpattern than in a dose-response curve plotting survival against concentration. (Svensson-Washington) W73-01977

DEVELOPMENT OF A TAPE TRANSPORT BACTERIAL DETECTION SYSTEM: FINAL

BACTERIAL DETECTION SYSTEM; FINAL REPORT, Aerojet Medical and Biological Systems, El Monte, Calif.
S. Witz, and W. H. Hartung.
Available from the National Technical Information Service as N72-190 93, \$3.00 in paper copy, \$0.95 in microfiche. Final Report No 1102F, (CR115 459), February 25, 1972. 200 p, 10 fig, 25 tab. Contract No NAS 9-11644.

Descriptors: "E. coli, "Clostridium, "Potable water, "Instrumentation, "Monitoring, Automation, Pollutant identification, Coliforms, Enteric bacteria, Water analysis, Design, Laboratory equipment, Cultures, On-site tests, Electrical equipment, Electronic equipment, Identifiers: "Chemiluminescence, "Detection limits, Clostridium sporogenes, Culture media, Sensitivity, Chemical interference, Sample preparation."

preparation.

The feasibility of a tape transport chemilu-minescence system for bacterial monitoring of regenerated water was demonstrated using a manually operated laboratory breadboard. The manually operated laboratory breadboard. The principle of detection is based on measuring the in-crease in chemiluninescence produced by the cata-lytic action of bacterial porphyrins on a luminol-hydrogen peroxide mixture. Viable organisms are distinguished from non-viable by comparing the signals of incubated and unincubated water samsignals of incubated and unincubated water samples. Using optimized protocols, sensitivities attained with 400 ml suspensions were: 30 - 35 cells/ml for total counts and 7 - 8 cells/ml for viable counts of E. coli and 1,000 - 10,000 cells/ml total and viable counts of Cl. sporogenes. Processing time for total counts was 37 minutes. For viable counts, it was 2.3 hours for E. coli and 4 hours of Cl. sporogenes. For viable counts, it was 2.3 hours for E. coli and 4 hours for CI. sporogenes. The operational procedures used for processing the incubated and unincubated samples involved the following sequence: (1) concentrating the sample by filtration through a membrane filter, (2) washing with dextrose-thioglycollate broth (DBT), (3) incubating (0 to 4 hours as required), (4) washing with 4 M urea, and (5) reacting with reagent in front of a photomultiplier tube (PMT). The signal output from the PMT was recorded on a strip chart recorder. In a study of the effect on sensitivity of exposing E. coli to distilled water at 160F, whereas a 4 hour immersion had no significant effect, a 24a 4 hour immersion had no significant effect, a 24hour immersion resulted in almost a complete loss in signal. The evidence indicates that bacterial m sama. The evidence indicates that bacterial porphyrins are discharged into solution as a result of cell lysing and leaching. In an evaluation of the ability of established protocols to operate in the presence of various bactericides which may be present in regenerated water, a decrease in signal ranging from 22 to 6.7 presents. ranging from 22 to 67 percent was observed, de-pending on the bactericide. Protocol modifications which might be used to minimize these effects are presented. In a summary of the various parameters which might be used to determine water quality, the ability to detect viable and non-viable bacteria as well as viruses, toxins and lysed organisms was singled out. (Little-Battelle) W73-02012

PHYSICAL CHEMISTRY OF EXTRACTION

PROCESSES, Institute of Nuclear Research, Warsaw (Poland). For primary bibliographic entry see Field 01B. W73-02014

AUTOMATED SEPARATIONS IN ROUTINE ACTIVATION ANALYSIS OF MERCURY, Interuniversitair Reactor Instituut, Delft (Nether-

J. J. M. De Goeij.

Available from the National Technical Informa-tion Service as IRI-133-71-5, \$3.00 in paper copy, \$0.95 in microfiche. Report No CONF-710626-1, 1971 (Paper presented at the 2nd Symposium on the Recent Developments in Neutron Activation Analysis, 28 June - 1 July 1971, Churchill College, Cambridge). 9 p., 5 fg. 2 tab.

Descriptors: "Separation techniques, "Automatic control, "Neutron activation analysis, "Mercury, "Methodology, "Instrumentation, Plant tissues, Heavy metals, Irradiation, Chemical analysis, Fish, Water analysis, Soil analysis, Birds, Foods, Industrial water Industrial wastes.

Industrial wastes.

Identifiers: *Biological samples, *Biological materials, Sensitivity, Precision, Chemical recovery, Sample preparation, Animal tissues, De-

tection limits.

A procedure has been adopted for an automated emical separation of mercury from those samples which require such for a nondestructive meapies which require such for a nondestructive mea-surement of the metal by neutron activation analy-sis. The problems of loss and adsorption of radioactive Hg while processing irradiated sam-ples are avoided. The automated instrument devised carries out the destruction, oxidation, and distillation of the irradiated samples. This automa-tion includes introduction of chemicals at appropriate times, control of the temperature in varipropriate times, control of the temperature in various stages of the treatment, and passage of air through the instrument during complete treatment. This instrument handles 6 samples simultaneously and produces 30-36 samples daily. Mercury analysis has a sensitivity of 1-0.1 ppb using a 1 g sample, an accuracy 3-4 percent in the ppm-range and 10-15 percent in the ppb-range, and a chemical yield of 97-98 percent. In one 5-day week about 90 irradiated samples (including standards and blanks) can be chemically processed, measured, and computed. The sensitivity and chemical procedure were satisfactory for nearly all of 2500 samples analyzed - sediments; mammalian, avian, and fish analyzed - sediments; mammalian, avian, and fish tissues; biological fluids; human hair; foodstuffs, industrial products and pharmaceuticals; plants and water. (Holoman-Battelle) W73-02015

COMPARISON OF BENTHIC INFAUNAL ABUNDANCE ON TWO ABVSSAL PLAINS IN THE NORTHEAST PACIFIC OCEAN WITH COMMENTS ON DEEP-SEA FOOD SOURCES, Oregon State Univ., Corvallis. Dept. of Oceanog-

raphy. A. G. Carey, Jr.

Group 5A—Identification of Pollutants

Available from the National Technical Informa-Available from the National Technical informa-tion Service as RLO-1750-67, \$3.00 in paper copy, \$0.95 in microfiche. Report No RLO-1750-67, 1970. 40 p., 3 fig., 6 tab, 69 ref. Grant Nos GB-4629, GB-531. Contract No AEC AT (45-1) 2227.

Descriptors: *Benthic fauna, *Ecological distribution, *Animal populations, *Biomass, *Deepwater habitats, Marine animals, Food abundance, Water Inditats, Marine animals, Post adulation, Annelids, Primary productivity, Pacific Ocean. Identifiers: *Species density, Infauna, Cascadia Plain, Tufts Plain, Polychaetes, Arthropods, Food

Benthic infauna was sampled in the Northeast Pacific Ocean at twelve stations on an east-west transect across Cascadia and Eastern Tufts Abyssal Plains to determine the effects of continental influences and depth. The two plains, separated by the East Pacific Rise, differ in depth, distance from the continental margin, and presumably therefore in the supply of food material available to organisms on the sea floor. Five benthic ecological zones were distinguished: Cascadia Plain Slope Base, Eastern Cascadia Plain, Cascadia Deep-Sea Channel, Western Cascadia Plain, and Eastern Tufts Plain. These differ in faunal biomass, numerical density, and gross composition of the fauna by phyla. The Slope Base environment supports the most abundant fauna, undoubtedly because of its proximity to the continent. The numerical density of infauna on Eastern Tufts Plain is similarit to that on Eastern and al Plains to determine the effects of continental ern Tufts Plain is similar to that on Eastern and Western Cascadia Plain; however, the biomass is significantly lower in the deeper, more distant en-vironment. It is concluded that these differences in the benthic fauna are caused by different levels of the bentuic rauna are caused by different levels of food supply. Faunal densities, biomass, and composition are similar to those found in other upper abyssal environment. The mean numerical abundance ranges from 176/sq m to 1053/sq m, and the mean biomass from 0.78 g/sq m to 7.89 g/sq m. Debubbate and Astheade sessions of the comparing 5.5.6 Polychaeta and Arthropoda together comprise 65.6 to 93.5 percent of the fauna of the 12 stations. Food sources of the abyssal fauna are discussed. nan-Battelle) W73-02017

DETERMINATION OF MANGANESE, COPPER, AND IRON IN HUMAN BLOOD BY NEUTRON ACTIVATION ANALYSIS, Reactor Centrum Nederland, Petten. H. A. Das, D. Hoede, J. J. Kroon, and J.

Available from the National Technical Informa-tion Service as RCN-155, \$3.00 in paper copy, \$0.95 in microfiche. Report, September 1971. 20 p,

Descriptors: *Manganese, *Copper, *Iron, *Neutron activation analysis, Heavy metals, Pollutant identification, Chemical analysis, Separation techniques, Methodology.

Identifiers: *Blood, Biological samples, Body

Procedures are given for the determination of manganese, copper, and iron in blood. Manganese and copper were determined by thermal neutron activation, followed by chemical separation. The iron-concentration was obtained by instrumental aron-concentration was obtained by instrumental fast neutron activation analysis. The average concentrations of Mn and Cu in human blood were 16 plus or minus 5 ng/g and 0.9 plus or minus 0.2 microgram/g, respectively. The Fe concentration ranged from 240-400 micrograms/g. (Holoman-Battelle) W73-02018

TECHNIQUES FOR SAMPLING BENTHIC OR-

GANISMS, Oregon State Univ., Corvallis. Dept. of Oceanog-raphy. For primary bibliographic entry see Field 07B. W73-02019

RADIONUCLIDES IN TRANSPORT IN THE COLUMBIA RIVER FROM PASCO TO VANCOUVER, WASHINGTON, Geological Survey, Portland, Oreg. Water Resources Div. For primary bibliographic entry see Field 05B. W73-02022

OPTICAL SIGNATURES OF THE NEAR-SHORE WATERS OF SOUTHERN MONTEREY BAY, Naval Postgraduate School, Monterey, Calif.

Navai rosugraduate School, Monterey, Cam. J. R. Potts. Available from the National Technical Informa-tion Service as AD-741 144, \$3.00 in paper copy, \$0.95 in microfiche. Master's Thesis, December 1971. 127 p, 4 tab, 9 ref.

Descriptors: *Optical properties, *Salinity, *Phosphates, *Coliforms, *Dissolved oxygen, *Particle size, *Sewage effluents, *Monitoring, Water analysis, Spectrophotometry, Regression analysis, Color, Water quality, Water temperature, Nutrients, Turbidity, Water pollution effects, Statistical methods.

Identifiers: Transmittance, *Monterey Bay (Calif).

A study was made to relate certain optical proper-ties with other observed properties of water sam-pled in southern Monterey Bay, California. Domi-nant wavelength, percent purity, and visual effi-ciency were determined for 65 near-shore water ciency were determined for so hear-snore water samples using a one-meter sample cell in a modified Beckman DU-2 spectrophotometer. Measurements made at the sample locations in-cluded salinity, surface temperature, phosphate, coliform count, oxygen, and particle size distribu-tion in the 1.94 micron to 27.5 microns diameter range. Most of the sampling was done at or near the Monterey sewage outfali. Dominant wavelengths were found to vary between 520 nm wavelengths were found to vary between 320 nm and 585 nm. Percent purity was found to fluctuate between 2 and 40 percent. Neither variable seems to be strongly sensitive to variation in treated sewage concentration for the Monterey outfall. Dominant wavelength for each of the 21 Forel-Ule scale colors was measured spectrophotometrically and compared with the dominant wavelengths of the samples. It is concluded that dominant wavelength, percent purity, and particle area or volume are poor signatures of sewage effluent from the standpoint of observing (visually) ef-fluent distributions and concentrations. (Little-W73-02027

TRACE-QUANTITY ENGINEERING, Monsanto Co., Dayton, Ohio. J. R. Fair, B. B. Crocker, and H. R. Null. Chemical Engineering, Vol 79, No 17, p 60-74, Au-gust 7, 1972. 10 fig, 2 tab, 38 ref.

Descriptors: *Trace elements, *Pollutant identification, *Separation techniques, Mercury, Sulfur compounds, Nitrogen compounds, Distillation, Evaporation, Salts, Aqueous solutions, Adsorption, Ion exchange, Membrane processes, Coagulation, Nucleation, Filtration, Chemical precipitation, Reverse osmosis, Reviews, Solvent extractions, Pollutants, Water pollution effects. Identifiers: Detection limits, Sulfur dioxide, Methyl mercaptan, Nitrogen dioxide, Flush distillation, Foam fractionation, Settling, Wet scrubers, Impingement separators, Electrostatic precipitators, Ultrafiltration.

The problems faced by chemical engineering in dealing with materials present in low concentration in mixtures are reviewed. Separation techniques for both homogeneous and non-homogeneous mixtures are discussed. The scope of the discussion is limited to fluid diluents but not only to pollution and environmental aspects. Uni-fying concepts and technical/economic considera-tions rather than details of individual techniques are emphasized. Trace quantities are considered to be concentrations of less than 5000 ppm and the discussion deals primarily with those less than 1000 ppm. (Mortland-Battelle) W73-02028

AN ESTIMATE OF PRIMARY PRODUCTIVITY IN A PENNSYLVANIA TROUT STREAM USING A DIURNAL OXYGEN CURVE TECHNIQUE, Bucknell Univ., Lewisburg, Pa. Dept. of Biology. W. F. McDiffett, A. E. Carr, and D. L. Young. The American Midland Naturalist, Vol 87, No 2, p 564-570, April 1972. 2 fig, 2 tab, 14 ref.

Descriptors: *Primary productivity, *Respiration, *Analytical techniques, *Diurnal, Streams, Diffusion, Photosynthesis, Dissolved oxygen, Water analysis, Pennsylvania. Identifiers: Data interpretation.

Primary productivity and community respiration were determined for a relatively unpolluted trout stream in Pennsylvania by using an upstream-downstream diurnal oxygen curve technique. Two diurnal oxygen curves were constructed from analyses of water samples collected on different days at 2-hour intervals in the day and at 3-hour intervals at night. Water temperatures were also recorded at the sampling times. From the data obtained, the rate of change of oxygen (X) between stations and diffusion rate (D) were calculated. Since the rate of change of dissolved oxygen at night can be attributed only to community respiranight can be attributed only to community respira-tion (R) and diffusion, an estimate of respiration within the reach was obtained by subtracting nighttime values of diffusion from the observed rates of change. Gross primary productivity was then estimated using the equation P equal to X minus D plus R. Values of 4.92 and 6.32 g oxminus D plus R. Values of 4.92 and 6.32 g ox-ygen/sq. m/day were obtained. Community respiration was 2.30 and 2.02 g oxygen/sq m/day for the same days. These values are compared with community metabolism data from other streams. (Little-Battelle) W73_02030

CHEMICAL ANALYSES OF WATER FROM WELLS IN HARRIS COUNTY, TEXAS, 1922-71, Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W73-02038

WATER RESOURCES DATA FOR COLORADO, 1971: PART 2. WATER QUALITY RECORDS. Geological Survey, Lakewood, Colo. For primary bibliographic entry see Field 02K.

THE DETERMINATION OF TRACES OF COBALT AND OF NICKEL IN MINERAL WATERS, For primary bibliographic entry see Field 02K. W73-02071

ADVANCES IN ANALYTICAL CHEMISTRY AND INSTRUMENTATION, VOLUME 9 - SPEC-TROCHEMICAL METHODS OF ANALYSIS.

John Wiley and Sons, Inc., Wiley-Interscience, New York, New York. 1971. J. D. Winefordner, editor, 530 p.

Descriptors: *Methodology, *Instrumentation, Chemical analysis, Pollutant identification, Heavy metals, Halogens, Antibiotics (Pesticides), Aromatic compounds, Organic compounds, Organic acids, Organophosphorus pesticides, Phosphothioate pesticides, Alkalime earth metals, Soil analysis, Water analysis, Chlorinated hydrocarbon. Identifiers: *Spectrochemical analysis, Detection limits, Infrared spectrometry, Flame emission spectrometry, Chemiluminescent flame spectrometry, Chemiluminescent flame spectrometry.

trometry, Rare er trometry fluoresce bon te minescen

This volu entation cal chem primarily qualitativ molecule (1) flame lar spect Processe trometry (4) 'Flam citation a timetry',
'Phospho the sign methods W73-020

For prim W73-020 HEAVY TRANSP SUBSTIT Missouri

S. E. Ma

Available

STUDIES

MENT, A

on Ser \$0.95 in Research August OWRR Descript transpor Nutrient

Phospha Identifie

*Potenti Chelatin

The che requiren reproduc garis an Optimal grams/l Chlorell: toxicityo copper algae at to keep toxic eff copper. dard add sis of co selective tive than though i

acetate iron), a medium W73-021 trometry, Chemical interference, Absorptiometry, Rare earth metals, Phosphorescence spectrometry, Flame absorption spectrometry, Flame fluorescence spectrometry, Phosphorimetry, Dysprosium, Organic solvents, Hydrocarbons, Carbon tetrachloride, Carcinogens, Chemiluminescence, Complexometric titration.

This volume reviews the basic principles, instru-mentation, and methods of application for analyti-cal chemists and scientists using spectrochemical methods of analysis. The information is directed primarily toward quantitative analysis rather than qualitative characterization of atoms and molecules, and covers two main areas of interest: (1) flame spectrometric methods, and (2) molecu-(1) flame spectrometric methods, and (2) molecular spectrometric methods. There are 8 separate articles each of which is written by an authority in the field: (1) 'Excitation and De-excitation Processes in Flames' (2) 'Flame Emission Spectrometry', (3) 'Flame Absorption Spectrometry', (5) 'Excitation and Emission in Solution', (6) 'Absorptimetry', (7) 'Fluorescence Spectrometry', and (8) 'Phoenhorscence Spectrometry', An appendix on Thosphorescence Spectrometry'. An appendix on the signal-to-noise ratio in spectrochemical methods is included. (Mackan-Battelle) W73-02096

STUDIES ON ALGAL GROWTH, DEVELOP-MENT, AND REPRODUCTION, California Univ., Irvine. For primary bibliographic entry see Field 05C.

W73-02099

HEAVY METAL ION INTERACTION AND TRANSPORT WITH SYNTHETIC COMPLEX-ING AGENTS AND DETERGENT PHOSPHATE SUBSTITUTES IN AQUATIC SYSTEMS, Missouri Water Resources Research Center, Rol-

S. E. Manahan, and M. J. Smith.

Available from the National Technical Informa-tion Service as PB-213 252, \$3.00 in paper copy, \$0.95 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, August 30, 1972. 181 p. 25 fig. 14 tab. 55 ref. OWRR A-049-Mo. (1) 14-01-0001-3525.

Descriptors: *Copper, Cultures, *Chelation, *Ion transport, *Heavy metals, Eutrophication, Pollu-tant identification, Toxicity, *Iron, *Chlorella, Nutrient requirement, *Algae, Detergents,

Phosphates. Identifiers: *Ion-selective electrodes, EDTA, *Potentiometry, Electroanalysis, *Algal cultures, Chelating agents, Occystis marssonii.

The chemical aspects of the copper micronutrient requirement for algae have been investigated. A garis and Oocystis marssonii was demonstrated.

Optimal growth was observed at garis and Occysis marssoni was demonstrated.
Optimal growth was observed above 40 micrograms/l for Occystis and 30 micrograms/l for Chlorella. A study of the effects of EDTA on the toxicityoof copper to Chlorella showed that copper in chelated form was not toxic to these these at concentrations was to 4 media copper. algae at concentrations up to 46 mg/l copper. When only sufficient chelating agent was present to keep the iron (III) in solution, however, the toxic effects of copper were evident at 7.00 mg/l of copper. A second aspect of the project involved the development of a simple, direct multiple standard addition method for the potentiometric analysis of copper in water with a solid-state copper ion selective electrode. The technique is more sensitive than conventional atomic absorption analysis, though not so rapid. Measurements are made in a complexing antioxidant buffer medium containing acetate (to complex copper), fluoride (to complex iron), and formaldehyde (to provide a reducing medium). W73-02112 MOBILITIES OF INJECTED IONS IN LIQUID WATER, Missouri Water Resources Research Center, Rol-

B. L. Henson. Available from the National Technical Informa-tion Service as PB-213 266, \$3.00 in paper copy, \$0.95 in microfiche. Missouri Water Resources Research Center Completion Report, October 3, 1972. 17 p. 3 fig, append. OWRR A-047-No. (1) USD OWRR-14-31-0001-3525.

Descriptors: Ions, *Ion transport, Pollutant identification, *Water vapor, *Nucleation, *Conductivity. Identifiers: *Electroanalysis, *Trace ionic impurities, Time of flight techniques.

The objectives were to develop methods for measuring the mobility of ions in water by means of ion injection techniques with the ultimate goal of using these data to investigate the feasibility of using the Hall effect to measure impurity ion mobilities at dilute ionic concentrations. A number of preliminary studies proved to be necessary in order to accomplish the primary goals. These ex-periments which have been completed include ion mobility studies in water vapor, studies of corona discharges from fine points in water vapor, injec-tion of ions into water using corona methods, and ejection of ions from water into water vapor. These measurements were performed for both positive and negative ions. Results indicate that injection techniques using coronas are not suitable for ion mobility measurements in water because injected charge densities are insufficient to overcome the natural conductivity of water even in its purest state. On the other hand, these studies have yielded new information which appear to be relevant to nucleation studies. W73-02114

MEASUREMENT OF LOW TURBIDITIES.

Florida Univ., Gainesville. A. P. Black, and S. A. Hannah. Journal of the American Water Works Associa-

tion, Vol 57, No 7, p 901-916, July 1965. 10 fig, 3 tab. 10 ref.

Descriptors: *Turbidity, *Instrumentation, *Analytical techniques, Water analysis, Water quality, Standards.
Identifiers: *Turbidimeters, *Jackson candle,

The need for more sensitive, reproducible measurements of turbidity prompted research into the nature of low turbidity measurements. The turbidi-ty of a sample is a function of instrument geometry, light source, and calibration procedure. Most of the experimental work was carried out using an absolute light-scattering photometer, with which calibration curves were made from three different clay suspensions. The calibration curves correlated the relative optical turbidity of the clay suspensions with Jackson turbidity units for vari-ous angles of scatter. Only at a 15-degree scatter angle was there a good agreement in correlation for all three clays. Most turbidimeters in use at the time received light scattered at wide angles around 90 degrees, resulting in turbidity variations by a factor of 5 or more, when calibrated on the Jackson candle value. If a 90-degree scatter angle is to be maintained, a different calibration standard than the Jackson unit should be adopted. On the other hand, if the Jackson candle turbidimeter is to remain as the turbidity standard for low-turbidity waters, an instrument measuring light scat-tered at low angles must be adopted. Turbidities as low as 0.01 Jackson units were measured with the absolute photometers using the carefully con-trolled calibration procedures described. (Nichols-AWWARF) W73-02147 -ARE THERE ANY, Naval Academy, Annapolis, Md. Dept. of Environmental Sciences. J. Williams. PHYSICAL-CHEMICAL CRISIS INDICATORS-

Journal of the Washington Academy of Sciences, Vol 62, No 2, p 174-183, June 1972. 13 fig.

Descriptors: "Monitoring, "Environmental effects, "Water poliution effects, "Chesapeake Bay, Sampling, Surveys, Data collections, Water quality, Hydrologic data, Estuaries, Hydrogen ion concentration, Salinity, Dissolved oxygen, Water temperature, Variability.

When the variation of pH, salinity, oxygen, and temperature was examined at 3 different locations in Chesapeake Bay, the natural variation was so great that any attempt at delineating a dangerous environmental situation by the simple monitoring of any single parameter would probably not be successful. The concept of a station signature is irroduced; the ratio of extreme value to average value is plotted for a number of selected parameters. Since these ratios are nondimensional the value is plotted for a number of selected parameters. Since these ratios are nondimensional, the relative variation of different parameters may be directly compared. It is suggested that the choice of crisis indicators should be determined by the particular ecological problem involved and will probably be different for different types of problems. Not only is it necessary to measure a series of parameters to indicate a crisis, but data must be taken over a long enough period of time to must be taken over a long enough period of time so that an average value for this period may be deter-mined with which to compare the extreme values encountered. (Knapp-USGS) W73-02150

MICROWAVE EMISSION CHARACTERISTICS OF OIL SLICKS, Aerojet-General Corp., El Monte, Calif. Microwave Div. A. T. Edgerton, D. Meeks, and D. Williams. In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif: New York, N Y, American Institute of Aeronau-tics, Paper No 71-1071, 1971. 6 p, 10 fig, 2 ref

Descriptors: Water pollution, *Oil spills, *Tracking techniques, *Microwaves, *Radiation, Instrumentation, Analytical techniques, Theoretial analysis, Laboratory tests, Aircraft, Data col-lections, Evaluation, Oil pollution, Oil-water inter-faces, *Pollutant identification. Identifiers: *Microwave emission, *Oil slicks.

A research study was carried out to determine the feasibility of using microwave radiometry for de-tection, identification and surveillance of oil pollu-tion. The study, was stimulated by the need for an airborne surveillance system which can detect oil pollution during day and night and in inclement weather. The study encompasses three areas of in-vestigation: (1) theoretical studies, (2) laboratory vestigation: (1) theoretical studies, (2) laboratory measurements, and (3) airborne measurements of controlled oil spills. The dependence of microwave emission on oil type, age, film thickness, observational wavelength, antenna viewing angle and polarization was examined in the laboratory. Airborne measurements of controlled oil spills were performed at wavelengths of 8.1 and 3.2 mm for several refined and crude oil s.1 and 3.2 mm for several retined and crude out slicks, over a broad range of ocean surface and weather conditions. Microwave emission charac-teristics of slicks vary with oil type, film thickness and sea state, and provide measurable signatures over a wide range of sea state conditions. (Woodard-USGS) W73-02162

A QUANTITATIVE EVALUATION OF DIS-SOLVED OXYGEN INSTRUMENTATION, National Oceanographic Instrumentation Center, Washington, D.C. For primary bibliographic entry see Field 05B. W73-02165

Group 5A-Identification of Pollutants

NEUTRON ACTIVATION ANALYSIS OF WATER—A REVIEW, International Nutronics, Inc., Los Altos, Calif. J. D. Buchanan, and K. J. Bialy. In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif: New York, N Y, American Institute of Aeronautics and Astronautics, Paper 71-1052, 1971. 8 p, 2 tab, 42 ref.

Descriptors: *Water analysis, *Chemical analysis, *Neutron activation analysis, *Analytical techniques, *Neutron absorption, Irradiation, Reviews, Nuclear reactors, Radioisotopes, Trace elements, Chemical properties, Water pollution sources, Instrumentation, Pollutant identification.

Reactor neutron activation analysis is a highly selective and sensitive method for determining a large number of trace elements in water. Current procedures involve gamma-ray spectrometry of the activation products either with or without simple radiochemical separations to increase the selectivity and sensitivity. Topics discussed include sources of neutrons, preirradiation physical and chemical treatment of samples, neutron capture samma-ray analysis, and selected applicaand chemical treatment of samples, neutron cap-ture gamma-ray analysis, and selected applica-tions. The ultimate sensitivity of neutron activa-tion analysis is proportional to the neutron flux in which the sample is irradiated. In general, there are three types of neutron sources: nuclear reac-tors, machine sources, and isotopic sources. Ad-vantages of isotopic sources over machine sources producing the same thermal neutron flux include greater flux stability and uniformity, reliability, the capability of unattended continuous operation, and the absence of maintenance ease of operation, and the absence of maintenance requirements. Within the last few years, a new high-intensity neutron source has become available. This is californium (Cf-252) which emits one. Jim is canorinum (C1-222) which emits neutrons directly in the process of radioactive decay by spontaneous fission. The half-life of Cf-222 is 2.656 years, which is comfortably long. (Woodard-USGS) W73-02166

LABORATORY METHODS FOR THE MEA-SUREMENT OF POLLUTANTS IN WATER AND

WASTE EFFLUENTS, National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab.

D. G. Ballinger. In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif: New York, NY, American Institute of Aeronautics and Astronautics, Paper No 71-1034, 1971. 6 p.

Descriptors: *Water analysis, *Pollutant identifi-cation, *Chemical analysis, *Analytical techniques, *Reviews, Laboratory tests, Trace elements, Methodology, Instrumentation, Water quality, Spectrophotometry, Colorimetry, Mass spectrometry, Gas chromatography, Heavy metals, Pesticides, Algicides.

The requirements for accurate, precise, and rapid analytical procedures for the examination of water and waste samples require the use of a variety of instruments. The instrumentation in water laboratories includes atomic absorption, UV-visible, and infrared spectrophotometers, automatic colorimetric analyzers, gas chromatographs, and mass spectrometers. Because of the emphasis on regulatory action, attention is being directed toward quality control of analytical results. Among the challenging problems are the differentiation of metallic species in water at nanogram concentrations, rapid measurement of free cyanide and free ammonia, more sensitive methods for arsenic and selenium, and improved characterization of organic contaminants. Available methods for a number of pollutants are reviewed with respect to the important variables of specificity, sensitivity, precision, speed, and automation. (Woodard-USGS) The requirements for accurate, precise, and rapid

WATER QUALITY MEASUREMENTS WITH AIRBORNE MULTISPECTRAL SCANNER Bendix Aerospace Systems Div., Ann Arbor,

Mich.
A. C. Conrod, and K. A. Rottweiler.
In: Joint Conference on Sensing of Environmental
Pollutants, November 8-10, 1971, Palo Alto, Calif:
New York, N.Y., American Institute of Aeronautics and Astronautics, Paper No 71-1096, 1971. 8

Descriptors: *Water quality, *Measurement, *Remote sensing, *Instrumentation, *Reviews, Aircraft, Aerial photography, Analytical techniques, Multiple purpose, Data processing, Computers, Thermal radiation, Water pollution sources, Oil spills, Water temperature, Suspended solids, Sediment transport, Ultraviolet radiation, Solar radiation.

Identifiers: *Multispectral scanners, *Scanner imagery:

imagery.

Airborne Multispectral Scanners, and examples of their application to water quality measurements, are described. Both commercial and NASA versions of aerial multispectral scanners are shown, with their associated ground data stations. The methods of using multispectral scanner data are illustrated. Several modes of data analysis, from direct inspection of imagery to computer processing, are briefly discussed, with comments on the information content of the imagery. Multispectral scanners allow the investigator to examine the optical and thermal properties of water, including temperature, color and transparency. In addition, floating or suspended matter can be detected, such as oil films, foams and slicks associated with waste discharges, and sediment loads from a variety of sources. The data processing options permit automatic retrieval and display of enhanced thematic maps, simplifying surveys aimed at pollution assessment and abatement. (Woodard-USGS)

EFFECTS OF SKYLIGHT POLARIZATION, CLOUDINESS, AND VIEW ANGLE ON THE DETECTION OF OIL ON WATER, National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.

J. P. Millard, and J. C. Arvesen.

In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto Calif. New York, N.Y., American Institute of Aeronautics and Astronautics, Paper No 71-1075, 1971. 7 p, 13 fig. 10 ref.

Descriptors: *Pollutant identification, Water pol-lution sources, *Oil spills, *Tracking techniques, *Remote sensing, *Environmental effects, Solar radiation, Cloud cover, Reviews, Evaluation, In-strumentation, Electromagnetic waves, Aircraft, Oil-water interfaces. Identifiers: *Oil slicks, View angle.

Three passive radiometric techniques, which use the contrast of sunlight reflected and backscattered from oil and water in specific wavelength regions, have potential application for remote sensing of oil spills. These techniques consist of measuring (1) total radiance, (2) the polarization components (normal and parallel of radiance, and (3) the difference between the normal and parallel components. The best view directions for these techniques are evaluated conclusions are drawn. components. Into best view directions for these techniques are evaluated, conclusions are drawn as to the most promising technique, and explanations are developed to describe why previous total-radiance measurements yielded highest contrast between oil and water under overcast skies. trast between oil and water under overcast skies. The technique based on measurement of only the normal polarization component appears to be the most promising. Measurements should be made at about 45 deg nadir view angle in the direction op-posite the sun. Overcast sky conditions provide a higher intensity of skylight relative to clear sky conditions and a lower intensity of backscatter within the water relative to surface reflectance.

These factors result in higher contrast between oil and water under overcast skies. (Woodard-USGS) W73-02183

PETROLEUM TANKER POLLUTION MONI-

TORING UNIT,
Bailey Meters and Controls Ltd., London (England).
R. S. Coomber.
Marine Engineers Review, p 29-31, June 1972. 5

Descriptors: *Monitoring, *Oil pollution, *Ultraviolet radiation, *Pollutant identification, *Oilwater interfaces, Water pollution control. Identifiers: *Tanker ballast.

An instrument system was designed to monitor the oil content of tanker ballast as it is discharged into the sea. Making use of principles of UV fluoresence, the instrument measures oil concentration in the water in parts per million. As the oil/water interface reaches the pump suction, a sudden increase in oil concentration triggers an alarm condition that automatically opens a valve connected to a slop tank and then closes the sea valve. This continuous measurement system connected to a stop tank and then closes the sea valve. This continuous measurement system avoids the need to locate the precise oil/water interface, guards against operator error, and allows load on top operation at any time and in any weather. Extensive operating experience gained during sea trials indicate that the system is both practical and reliable. (Murphy-Texas) W73-02194

ANALYSIS OF CHLORINATED HYDROCAR-BON PESTICIDES IN WATERS AND WASTE-WATERS,

Department of the Environment, Ottawa (On-tario). Inland Waters Branch. A. S. Y. Chau

Report, 1972. 56 p. 14 fig, 64 ref, append.

Descriptors: "Pesticides, "Chemical analysis, "Methodology, "Water pollution sources, "Canada, Analytical techniques, "Pollutant identification, Sampling, Laboratory tests, Gas chromatography, Mass spectrometry, Spectrosco-

py. Identifiers: *Methods manual.

Methods, procedures and techniques used in Canadian Water Quality Division laboratories at Ottawa, Burlington, Moncton, and Calgary, for the analysis of chlorinated hydrocarbon pesticides in waters are outlined. Published methods for in waters are outlined. Puosned methods tor pesticide-residue analysis were modified for deter-mining pesticides in waters and wastewaters. In conjunction with the commonly used gas-liquid-chromatography (GLC) and thin-layer-chromatog-raphy analysis, chemical derivatives to lowed by GLC examination of the derivatives Tollowed by GLC examination of the derivatives are used extensively to confirm pesticide identities. No universal methods exist that could be applied to samples from various sources and with different combinations of pesticides. The nature of co-extractives will vary with the location from which the samples are taken, and no completely comprehensive clean-up procedure and analytical methods are available to meet the problems encountered in each sample. (Woodard-USGS)

LOW-FLOW STUDY OF STREAMS IN ALBANY COUNTY, NEW YORK, Geological Survey, Albany, N.Y. For primary bibliographic entry see Field 07C.

TIME STABILITY OF AQUEOUS APDC AND ITS MANGANESE AND NICKEL COMPLEXES

ITS MIBK,
IN MIBK,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02K.

W73-02318

W73-02320

MEASURE WASTEWA TIONS, Connecticu tal Engineer For primary W73-02334

A MASS METALS WATERSH Delaware U For primary W73-02341

STRUCTUI SYSTEMS, necticu A. R. Giaqu Ph.D. disse 10 append. 3507.

Descriptors solutions, identification pounds, Wa Identifiers: *Amide-wa volumes, Formamide

Apparent a mined as homologou ubstituted which alle changes to amide-wate exception analyses sl apparent ramide. Dep with the methylpara showed ab mole fract an alkyl s were four mides in Change in pure amide dilute aque e transfe of the nun Observed function proposal t water mixt a relatively W73-0234

ANALYSE IN WASTI Connectic K. E. Neu M.S. Thes 030-CON

Descriptor water trea Tertiary tr dentifiers Nitrate-nit

The role and the discussed. of a Total W73-02320

MEASURES OF ORGANIC POLLUTANTS IN WASTEWATER TREATMENT PLANT OPERA-

Tiuris, Connecticut Univ., Storrs. Dept. of Environmen-tal Engineering.

For primary bibliographic entry see Field 05D.

W73-0234

METALS IN SEVERAL DELAWARE WATERSHEDS—A PROGRESS REPORT, Delaware Univ., Newark. Dept. of Geology; and Delaware Univ., Newark. Coll. of Marine Studies. For primary bibliographic entry see Field 05B. W73-02341

STRUCTURAL ASPECTS OF AMIDE-WATER SYSTEMS,

ecticut Univ., Storrs.

Connecticut Univ., Storts. A. R. Giaquinto. Ph.D. dissertation, 1972. 172 p, 5 tab, 19 fig, 36 ref, 10 append. OWRR A-049-CONN (2) 14-31-0001-3507.

Descriptors: *Amino acids, *Peptides, *Aqueous solutions, *Solubility, Pesticides, Pollutant identification, Nitrogen compounds, Organic compounds, Water chemistry.

Identifiers: Water-peptide structure, *Amides, *Amide

*Amide-water ater mixtures, *Apparent molar *Dilatometry, Methylparaben, Alkyl,

Apparent and partial molar volumes were deter-mined as a function of mole fraction for an homologous series of N-substituted and N,N-disubstituted amides using a dilatometric technique which allowed the determination of volume changes to within (+ or -)2 x 0.00001 ml. Solubility of methylparaben in pure amides and in various amide-water mixtures was also determined. With exception of formamide, results of dilatometric exception of formamide, results of distometric analyses showed a minimum appearing in plots of apparent molar volume versus mole fraction of amide. Depth and location of these minima varied with the alkyl substitution. Solubility data on methylparaben in various amide-water mixtures showed abrupt change from linearity at low amide mole fractions, particularly when amide contains an alkyl substitutent. N,N-disubstituted amides were found more effective than N-substituted amides in increasing methylparaben solubility. Change in partial molar volume upon transfer of pure amide from pure environment to an infinitely dilute aqueous solution was found to be a linear function of molar volume of the amide. Values of Tunction of molar volume of the amide. Values of the transfer were also shown as a linear function of the number of methylene groups on the amide. Observed changes in apparent molar volume as a function of amide concentration led to the proposal that molar volumes of amides in amidewater mixtures could be accounted for on basis of a relatively simple mixing model.

W73-02343

ANALYSIS OF RESIDUAL TOTAL NITROGEN IN WASTEWATERS.

Connecticut Univ., Storrs.

K. E. Neumann. M.S. Thesis, 1972. 245 p, 21 tab, 54 fig. OWRR A-030-CONN (2) 14-31-0001-3507.

Descriptors: *Analytical techniques, *Waste water treatment, *Nitrogen, *Volumetric analysis, Tertiary treatment, Activated carbon, Monitoring, Identifiers: *Total nitrogen, Ammonia-nitrogen, Nitrate-nitrogen.

The role of nitrogen in the aquatic environment and the dangers of nitrogenous forms are discussed. The research explores the applicability of a Total Nitrogen Analyzer employing an 800 C

pyrolysis furnace and a microcoulometric titration to water and waste water nitrogen analysis. The findings are supported by data on aquatic sources. For example, the University of Connecticut sewage treatment plant removes 19 mg/L total nitrogen from the mean influent concentration of 42 mg/L total nitrogen according to the analyzer. Activated carbon was found to remove only about 75% of the oxidizable organic nitrogen forms detected in samples of secondary effluent; that is, activated carbon leaks about 2 to 4 mg/L organic-nitrogen. A procedure and mechanism were developed for the analytic separation of ammonianitrogen from nitrate-nitrogen and from the other nitrogenous forms found in wastewater samples. The method yielded three recorder printouts (peaks) from a single syringe injection. Theoretically, changes in nitrogen concentrations and pyrolysis furnace and a microcoulometric titration cally, changes in nitrogen concentrations and chemical forms are significant indicators of pollution. The Total Nitrogen Analyzer is cited as hav-ing wide applicability to the instrumental parameter measurement of nitrogen in the aquatic en-vironment leading to the monitoring of waters and the automization of water and wastewater treatment plants. W73-02345

HEAVY METAL ANALYSES OF FRESHWATER

MACROINVERTEBRATES FROM THE LOWER HAW AND NEW HOPE RIVERS, North Carolina Univ., Chapel Hill. Dept. of En-vironmental Sciences and Engineering. J. E. Minogue. M.S. Thesis, 1972, 67 p, 23 fig, 4 tab, 24 ref, 8 ap-pend. OWRR A-056-NC (1).

Descriptors: *Heavy metals, *Benthos, *Aquatic environment, Cadmium, Chromium, Mercury, Lead, Zinc, Trace elements, *North Carolina, Pollutant identification

Identifiers: *New Hope River (NC), *Haw River (NC), *Cape Fear River (NC), Toxic substances.

Cadmium, chromium, mercury, lead, and zinc levels in benthic macroinvertebrates in the New Hope and lower Haw drainages were investigated to determine the usefulness of such organisms as indicators of metal contamination in the aquatic environment. Analyses were performed on freezeconcentrated water samples and perchloric-nitric acid digested organisms using atomic absorption spectroscopy. Mercury was determined by the flameless method. Levels in the organisms followed the sequence Cd<Pb = Hg<Cr<Zn. Highest levels were found in the summer and early fall. High chromium levels in the lower Haw River water could be correlated with high levels in the organisms. However, no one organism of those investigated concentrated any of the five metals to a resugated concentrated any of the five metals to a greater degree consistently than any other organism. Benthic macroinvertebrates should be used only as a rough indication of metal contamination and suspect water should be examined directly. W73-02356

WATER QUALITY CHARACTERISTICS AND THEIR MEASUREMENT, Honeywell, Inc., Fort Washington, Pa. Industrial

Div. A. H. Keyser. Instrumentation, Vol 20, No 1, p 6-11. 1967. 7 fig.

Descriptors: *Instrumentation, *Remote sensing, Telemetry, Dissolved oxygen analyzers, Analytical techniques, *Water quality, Data collections.

It is possible today to continuously measure the It is possible today to continuously measure the following water quality parameters: pH, conductivity, dissolved oxygen, temperature (air and water), turbidity, oxidation-reduction potential, flow, sunlight intensity, stage or level, wind direction, and wind speed. Water quality sensors being permanently installed are best located in a sheltered area where they can be easily inspected and serviced. Data may be recorded on an analog or graphic chart record, or with an automatic typewriter, or on punched paper tape. Frequency telemetering or digital transmission can be used to telemeter data to the point of recording. (Weir-AWWARF) W73-02427

AUTOMATIC SYSTEM FOR MONITORING

WATER QUALITY,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology,
B. W. Parker, J. A. Freeburg, and S. Barber.
Journal of the Sanitary Engineering Division,
Proceedings American Society of Civil Engineer,
Vol 86, No SA4, p 25-40, July 1960. 1 tab., 2 fig., 29

Descriptors: *Water quality, *Remote sensing, Automatic control, *Instrumentation, *Sampling, Analytical techniques, *Delaware River basin.

Personnel of the Lehigh Water Resources Research Council, under contract to the Interstate Commission on the Delaware River Basin, have Commission on the Delaware River Basin, have developed a fully automatic sampling facility for parameters which are indicative of water quality. The pilot station at Riegelsville, New Jersey, is currently recording temperature, pH, conductivity, dissolved oxygen, and turbidity. An interconnected network of stations for the Delaware River is proposed. (Weir-AWWARF)

METHODS FOR ORGANIC PESTICIDES IN WATER AND WASTEWATER. National Environmental Research Center, Cincin-

nati, Ohio. Analytical Quality Control Lab.

EPA Report, 1971. 56 p. 6 fig. 4 tab. 41 ref. append.

Descriptors: "Water analysis, "Gas chromatography, "Sampling, "Chlorinated hydrocarbon pesticides, Chemical analysis, Test procedures, Separation techniques, Solvents, Volumetric analysis, DDT, Aldrin, Heptachlor, Dieldrin, Endrin, Sodium sulfate, Organophosphorus pesticides, Halides, Alcohols, Laboratory equipment, Nitrates, Standards, Methodology, Pesticide residues. residues.

Identifiers: *Polychlorinated biphenyls, Ethyl ether, Flame photometric detector, Lindane, Kelthane, Perthane, Methoxychlor, Toxaphene, Strobane, Chlorodane, Endosulfan I, Endosulfan II, Electron capture gas chromatography, Stan-II, Electroli capine gas cinomatography, Gardard methods, Column chromatography, Thin layer chromatography, Gas liquid chromatography, Qualitative analysis, Microcoulometric gas chromatography.

This manual of methods for analysis of pesticides is designed to enable EPA and other laboratories nize procedural errors within each laboratory and to optimize agreement of analytical results from various laboratories. Part I, entitled results from various aboratories. Part 1, entured Recommended Practice for the Determination of Organic Pesticides in Water', presents a general discussion, helpful hints and suggestions, and precautionary measures required for sample col-lection, sample handling, equipment cleaning, calibration, concentration of extracts, and analysis by gas-liquid chromatography, column chromatography, and thin-layer chromatography. Part II, 'Methods of Analysis', covers a procedure for organochlorine pesticides. Specifically, the procedure describes the use of an effective co-solvent for efficient sample extraction; provides, through use of thin-layer, column chromatography, and liquid-liquid partition, methods for the elimination of non-pesticide interferences, and the pre-separation of pesticide mixtures. Identifica-tion is made by selective gas chromatographic separations through the use of two or more unlike columns. Detection and measurement is accom-plished by electron capture, microcoulometric or electrolytic conductivity gas chromatography.

Group 5A-Identification of Pollutants

Techniques for confirming qualitative identifica-tions are suggested. Results are reported in micro-grams per liter without correction for recovery data. (Snyder-Battelle) W73-02436

THE SYSLAB SYSTEM FOR DATA ANALYSIS OF HISTORICAL WATER-QUALITY RECORDS (BASIC PROGRAMS), Geological Survey, Washington, D.C. For primary bibliographic entry see Field 07C.

W73-02437

CHEMICAL ASPECTS OF BIOASSAY TECHNIQUES FOR ESTABLISHING WATER QUALITY CRITERIA, Wisconsin Univ., Madison. Water Chemistry Pro-

G. F. Lee, and G. D. Veith.

Meeting, September 1971, Washington, D.C. (1971) 41 p. 47 ref.

Descriptors: *Analytical techniques, *Bioassay, *Chemical reactions, *Water chemistry, *Water *Chemical reactions, *Water chemistry, *Water quality standards, Oxidation-reduction potential, Solubility, Ions, Organic compounds, Toxicity, Wisconsin, Sorption, Chemical properties, Laboratory tests, Sampling, Biochemistry, Hydrogen ion concentration, Chelation, Kinetics, Salts, Thermodynamics, Toxins, Model studies, Dissolved solids, Trace elements, Calcium, Magnesium.

Identifiers: Chemical complexation, Ionic strength, Acid-base, Salt ratios, Trace metals, Sub-lethal toxicity.

The various aspects of the chemistry of natural waters which may influence the bioassay procedures being used to establish water quality criteria are discussed and recommendations mad for procedures for minimizing problems. Although bioassays provide essential information for evaluating the significance of hazardous chemicals in the environment and for establishing control measures for their use, the accuracy with which the results of the bioassay can be extrapolated to environmental conditions depends largely on knowledge of the chemical state in the environment and ability to reproduce that state under test conditions of a bioassay procedure. In designing tests, there must be a good knowledge of test or ganisms' characteristics, and the physical and chemical environment of the test. The chemical environment must include a detailed description of the types of chemical reactions possibly occurring within the test system which could affect the forms of the elements throughout the course of the bioassay test. Review of the redox, acid base, precipitation, complexation gas exchange sorption (biotic and abiotic) and biochemical transformation reaction thermodynamics and kinetics should be made, based on information available in the literature. (Jones-Wisconsin)

THE POTENTIAL OF PHYSICAL MODELS TO INVESTIGATE ESTUARINE WATER QUALITY PROBLEMS, Army Engineer Waterways Experiment Station,

Army Engineer Waterways Experiment Stat Vicksburg, Miss. For primary bibliographic entry see Field 05C.

APPLICATIONS OF SOME NUMERICAL MODELS TO PACIFIC NORTHWEST ESTUA-Pacific Northwest Water Lab., Corvallis, Oreg. For primary bibliographic entry see Field 05C. W73-02456

MODELING MATHEMATICAL OF ESTUARINE BENTHAL SYSTEMS,
Oregon State Univ., Corvallis. Dept. of Civil Eneering. For primary bibliographic entry see Field 05C. W73-02457

CHARACTERISTICS OF ESTUARINE SEDI-MENTS OF THE UNITED STATES, Geological Survey, Washington, D.C. For primary bibliographic entry see Field 02L.

SALINITY-RELATED POLYMORPHISM IN THE BRACKISH-WATER
CYCLOTELLA CRYPTICA,
Connecticut University, Storrs. DIATOM Biological Sciences Group.
For primary bibliographic entry see Field 05C. W73-02548

POLLUTION AND THE ECOLOGY OF NEARSHORE PERIPHYTON OF LAKE SU-PERIOR: THE EFFECTS OF CALEFACTION ON PERIPHYTON,
Minnesota Univ., Minneapolis, School of Public For primary bibliographic entry see Field 05C. W73-02556

THE EFFECTS OF DIVALENT METAL IONS ON THE MICELLAR PROPERTIES OF SODI-UM DODECYL SULFATE, Missouri Univ., Rolla. Dept. of Metallurgical Engineering.
For primary bibliographic entry see Field 02K.
W73-02557

STANDING CROPS OF ELEMENTS AND ATOMIC RATIOS IN A SMALL MAMMAL COMMUNITY.
Savannah River Ecology Lab., Aiken, S.C.
R.J. Beyers, M. H. Smith, J. B. Gentry, and L. L.

Acta Theriol. Vol 16, No 8-18, p 203-211, 1971.

Descriptors: *Atomic ratios, Blarina-Brevicauda, *Trace, Elements, *Mammals, Ochrotomys-Nuttalli, Peromyacus-Gossypinus, Standing crops, *South Carolina.

Specimens of Blarina brevicauda, Peromyscus gossypinus and Ochrotomys nuttalli were analyzed for their content of Ca, K, Na, Mg, Fe and Zn. Elemental concentrations and atomic and 2h. Esemental concentrations and atomic ratios for every element except Fe were found to be essentially the same for each species. Standing crops of these 6 elements were calculated for the small mammal populations of 2 sites located in the lowland mesic-hardwood forests on the Savannah River Plant in South Carolina. Total standing crops of elements were similar for all sites regardless of the presence or absence of certain species of the small mammal community. Consecutive 1000. small mammal community.—Copyright 1972, Biological Abstracts, Inc.

5B. Sources of Pollution

TRANSITION METALS OF IMPOUNDED WATERS, Georgia Inst. of Tech., Atlanta. Environmental

Resources Center.

J. J. Heise. J.J. Heise.

Available from the National Technical Information Service as PB-213 160, 33.00 in paper copy, 80.95 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-0172, June 1972. 46 p, 26 fig, 22 ref. OWRR B-023-GA (1). 14-01-0001-1587. Descriptors: *Iron, *Manganese, Limnology, Lakes, Hypoliranion, Epilimnion, *Reservoirs, *Seasonal, *Metals, Pollutant identification, *Stratification, Ions, Iron compounds, Water pol-

Identifiers: Mineral stratification, *Lake Allatoona (Geo), Lake muds, *Transition metal ions.

Seasonal cycles in the concentration and chemical Seasonal cycles in the concentration and chemical form of transition metal ions in reservoir waters and stratifications of metal concentrations within the depth profiles have been documented. The changes in concentration of iron and manganese through the year with changes in temperature, acidity, and biotic activity are described. Particularly and biotic activity are described. through the year with changes in temperature, acidity, and biotic activity are described. Particular attention was paid to time and depth differences in concentrations of certain valence states of manganese and iron by use of electron spin resonance (ERS) absorption and atomic absorption (AA) techniques. ESR was used to determine the concentration of the divalent valence state of manganese (Mn++) and to compare it to the total concentration of manganese as determined by AA. The results showed significant differences between the amount of manganese found by the two techniques at any one point. The proportion in Mn++ form at all the sampling sites was found to increase with time through the summer, and with lower depths in the hypolimnion compared to the surface epilimnion. Iron proved to be unsuitable for ESR analysis because of its complexion into organic and mineral forms that do not allow valence state ESR analysis. However, some solid natural mineral deposits from Lake Allatoons yielded complex ESR spectra that suggest that they are made up of some ferro-manganese complex. (James-Georgia Tech)

CHEMICAL AND SEDIMENT MOVEMENT FROM AGRICULTURAL LAND INTO LAKE ERIE, Ohio State Univ.. Columbus. Water Resources

G. O. Schwab, and E. O. McLean. G. O. Schwab, and E. O. McLean. Available from the National Technical Informa-tion Service as PB-213 192, \$3.00 in paper copy, \$0.95 in microfiche. Ohio Water Resources Center, Columbus, Completion Report No 390X, September 1972. 34 p., 3 fig., 12 tab, 12 ref. OWRR A-018-OHIO (1). 14-01-0001-3535.

Descriptors: *Lake Erie, Water quality, *Sediment discharge, *Pesticide removal, Drainage systems, Drainage water, Nitrogen, *Phosphorus, *Nutrient removal, *Ohio, Path of pollutants, Biochemical oxygen demand, Hydrogen ion concentration, Dissolved solids, Fertilizers. Identifiers: *Sandusky (Ohio), Electrical conductivity.

Sediment, total solids, nine plant nutrients, five pesticides, electrical conductivity, pH, and BOD in tile effluent and in surface runoff were measured from field plots on Toledo silty clay soil near Sandusky, Ohio, for the period 1969-71. Measurements were taken from both conventional tilled and no tilled plots in continuous corn. Losses varied from year to year, but were generally small or insignificant. Laboratory studies on the movement of phosphorus were made for three soils (including Toledo).

W73-01957

TRANSFER OF PESTICIDES THROUGH WATER, SEDIMENTS AND AQUATIC LIFE, Rhode Island Univ., Kingston.

Rhode Island Univ., Kingston. C. E. Olney. Available from the National Technical Informa-tion Service as PB-213 172, \$3.00 in paper copy, \$0.95 in microfiche. Completion Report, (1972). 11 p, 1 tab. OWRR A-038-RI (1), 14-31-0001-3240.

Descriptors: *Chlorinated hydrocarbons pesticides, *Pesticide residues, Water pollution sources, *Rhode Island, Sediments,

*Polychle secticide Identifier

ponds as

have acc most wa ples. Oth found in lindane, few exce be postu or 10 ppt while res

Maine U Jeffrey. Availab tion Ser \$0.95 i port, Se A-020-N Descrip water, investig Path of

cation,

SOILS

SYSTEM

determ cation outwas ter stud ground manure acre. R curred soil ju times a form a sandy up to years. macce

ANAL DISPE Rutge R. C. Availa tion S \$0.95 Repor

the pro

W73-0

Descr perati *Polychlorinated biphenyls, *DDT, *Dieldrin, *Insecticides. Identifiers: *Chlordane, Lindane, Dacthal, Endosulfan I, a-BHC.

Analysis of water, sediment and fish from 32 ponds and rivers of Rhode Island indicate that residues of polychlorinated biphenyls (PCB's) have accumulated in the sediments and fish of most watersheds of the state. Residues of DDT and its metabolites were also found in most samples. Other chlorinated hydrocarbon insecticides found in some samples were chlordane, dieldrin, indane, a-BHC, endosulfan I, and dacthal. With a few exceptions, where local contamination might be postulated, no residues exceeding 50 ppt PCB or 10 ppt pesticide were detected in water samples, while residues in whole fish (wet weight basis) and sediments (dry weight basis) were less than 500 ppb PCB, 500 ppb DDT, 50 ppb chlordane and 50 ppb dieldrin.

EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUND WATER SYSTEMS, Maine Univ. Orong Deat of Sail Sciences

Maine Univ., Orono. Dept. of Soil Sciences. F. E. Hutchinson, R. A. Hoffman, and R. F.

F. B. Hutchinson, R. A. Hottman, and R. F. Jeffrey.
Available from the National Technical Information Service as PB-213 173, \$3.00 in paper copy, \$9.95 in microfiche. Maine Water Resources Research Center, Orono, Project Completion Report, September 1972. 38 p, 8 fig, 21 tab. OWRR A-020-ME (1).

Descriptors: "Water pollution sources, "Ground-water, "Farm wastes, 'Nitrogen, 'Maine, On-site investigations, Analytical techniques, Poultry, Path of pollutants, Soil properties, Rates of appli-cation, Infiltration rates, Data collections. Identifiers: "Poultry manure.

This research project was conducted in Maine to determine the maximum acceptable rates of appli-cation of manure in: (1) excessively drained glacial outwash, (2) well drained glacial till and (3) poorly drained Maine soils, using field plots and a lysime-ter study. Periodic analyses of soil, soil water and groundwater samples from a Windsor loamy sand treated annually for two years with poultry manure at nitrogen rates up to 1400 pounds per acre. Results indicate that mineralization of N occurred rapidly and that nitrate content of the subsoil just above the groundwater became high at times at rates above 350 pounds of nitrogen per acre. Nitrogen did not move downslope in any form at the top of the fragipan in a Charlton fine sandy loam beyond a distance of 20 feet on a 10 percent slope below plots treated with rates of N up to 1400 pounds per acre for two consecutive years. When nitrogen in poultry manure was ap-plied to a poorly drained Scantic silt loam, an unacceptable amount of nitrate N moved through unacceptance amount of mirate N moved through the profile into the free water table from applica-tions greater than 200 pounds of N per acre. (Woodard-USGS) W73-01960

ANALYSIS DISPERSION. OF THERMAL POLLUTION

DISPERSION,
Rutgers - The State Univ., New Brunswick, N.J.
Water Resources Research Inst.
R. C. Ahlert.
Available from the National Technical Information Service as PB-213 175, \$3.00 in paper copy, \$0.95 in microfiche. New Jersey Water Resources. Research Institute, New Brunswick, Completion Report, Sept. 1972, 4 p. 8 ref. OWRR A-019-NJ (5).

Descriptors: *Dispersion, *Turbulent flow, *Temperature, *Thermal pollution, Turbulence, Momentum transfer, Dissolved oxygen, Oxygen demand, Water pollution sources, *Path of pollu-

Identifiers: Temperature distribution, Velocity profile, Thermal plumes.

The dispersion of heated effluents in three spatial coordinates was studied. Detailed results are described in a series of publications of which this described in a series of publications of which this report provides a summary. Results include a state-of-the-art review of temperature dependencies for various water quality parameters, a description of techniques used in the development of momentum and energy transport models, a coupling of the energy equation with mass balance equations for biochemical oxygen demand and dissolved oxygen, the verification of relationships in an experimental flume, and the development of a new momentum transport model.

W73-01962 73-01962

INFLUENCE OF MIST IRRIGATION ON GROWTH, VIELDS, AND QUALITY OF POTATOES AND SNAP BEANS, Minnesota Univ., Minnespoits. Water Resources Research Center For primary bibliographic entry see Field 03F. W73-01966

THE INFLUENCE OF MIST IRRIGATION ON THE POTATO IV. TUBER QUALITY FAC-

Minnesota Univ., St. Paul. Dept. of Horticultural Science. For primary bibliographic entry see Field 03F. W73-01968

THE INFLUENCE OF A SHORT PERIOD OF EVAPORATIVE COOLING ON THE DISTRIBU-TION OF 14C IN POTATO PLANTS, Minnesota Univ., St. Paul. Dept. of Horticultural

For primary bibliographic entry see Field 03F. W73-01969

AN ECOSYSTEMATIC STUDY OF THE SOUTH

RIVER, VIRGINIA, Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources ResearchCenter. For primary bibliographic entry see Field 05C. W73-01972

DETERMINATION OF THE RATE OF BIODEGRADATION IN SOME POLLUTED TROPICAL WATERS AND IN SOME TYPES OF LIQUID WASTES COMMON IN PUERTO

RICO, Puerto Rico Univ., Mayaguez. Water Resources Research Inst.

Available from the National Technical Informa-tion Service as PB-213 181, \$3.00 in paper copy, \$0.95 in microfiche. Puerto Rico University Water Resources Research Institute Completion Report, September 1972. 80 p, 1 fig, 3 tab, 16 ref, append. OWRR A-023-PR (1).

Descriptors: *Water pollution sources, *Domestic wastes, *Industrial wastes, *Biodegradation, *Puerto Rico, Streams, Bays, Freshwater, Sea Mathematical studies, Equations, WATER TEM-PERATURE, Biochemical oxygen demand. Identifiers: Diluted wastes.

The first part of this study evaluates methods for the determination of deoxygenation (biodegrada-tion) rates of polluted waters in Puerto Rico. The non) rates of pounted waters in reacro kico. The experimental part of the study was divided into three phases. The first phase consisted in working with the waste as it came from the particular source to determine its value of K (biodegradation constant) in its original state. The second and third phases of the study consisted in diluting the waste ith natural river and sea water to simulate the

condition of the waste when discharged into a natural body of water. The K value tends to b higher when the wastes are mixed with natural waters than in their original concentrated state. The degree of dilution does not seem to have any significant effect. On the other hand, when the dilution water is sea water the value of K tends to be higher than when the waste is diluted in fresh water. Two domestic wastewaters studied showed K values higher than the standard accepted value of 0.1, the median value being of the order of 0.14. The median K value for wastewaters from two feed mills was about 0.29. (Woodard-USGS)

ESTUARIES, BAYS AND COASTAL CURRENTS

AROUND PUERTO RICO, Puerto Rico Univ., Mayaguez. Water Resources Research Inst. E. F. Colon.

Puerto Rico Water Resources Research Institute Partial Technical Completion Report 7, (71-31-7), December 1971. 83 p. OWRR A-031-PR (9).

Descriptors: *Currents (Water), *Bays, *Coasts, *Puerto Rico, *Data collections, Current meters, Velocity, Water temperature, Outfall sewers, Out-lets, Forecasting, Water pollution sources, Path of pollutants, Water pollution control, Hydrologic data, Flow characteristics, Estuaries, Oceans.

Coastal currents around Puerto Rico were studied to determine sites for waste outfalls. Currentdirection, temperature, and velocity meters were used simultaneously in a triangular pattern or in line. In some cases, all three instruments were used vertically at different depths. Records were taken for half of a moon-cycle for each of the 3 stations and a continuous recording was obtained for all three measurements. The data are shown by vectors every 10 degrees on a magnetic rose and in tabular form indicating the relative volume of water passing through the station every 10 degrees during the entire study period. This is the seventh partial completion report of an undetermined number of stations to be studied. Domestic and industrial wastes that have been discharged for dustrial wastes that have been discharged for many years along the coastal waters of Puerto Rico without adequate treatment have caused heavily polluted bays. With the rapid population increase and industrial growth, this problem is expected to grow at a geometric rate. Recent federal ocean disposal restrictions require definite assurance that new outfalls will be properly located in order to protect recreational areas as well as the ocean environment. (Woodard-USGS) W73-01974

WATER QUALITY CRITERIA DATA BOOK -VOLUME 3: EFFECTS OF CHEMICALS ON AQUATIC LIFE, SELECTED DATA FROM THE LITERATURE THROUGH 1968.
Battelle Memorial Inst., Columbus, Ohio. For primary bibliographic entry see Field 05C. W73-01976

MILITARY OCEAN TERMINAL, SUPPOINT, NORTH CAROLINA (DRAFT VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Wilmington, N.C. For primary bibliographic entry see Field 04A. SUNNY W73-01981

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND THEIR SUPPORT FACILITIES, Naval Ship Systems Command, Washington, D.C. M. E. Miles, G. L. Sjoblom, and R. D. Burke. Radiation Data and Reports, Vol 13, p 469-478, September 1972. 4 tab, 24 ref.

Group 5B-Sources of Pollution

Descriptors: "Nuclear wastes, "Radioactive waste disposal, "Ships, "Federal government, Radioactive wastes, Chemical wastes, Radioactivity, Radiochemical analysis, Background radiation, Tritium, Strontium radioisotopes, Water quality, Nuclear energy, Environmental effects, Nuclear reactors, Water pollution sources, Submarines.

The radioactivity in wastes discussed originates in the pressurized water reactors of U.S. Naval nuclear-powered ships. The principal source of the radioactivity is from trace amounts of corrosion and wear products from reactor plant metal surfaces in contact with reactor cooling water. Nearly all radioactive discharges occur in shipyards and support facilities of nuclear-powered ships. The amount of radioactivity involved has had no significant or discernable affect on the quality of the amount of radioactivity involved has had no sig-nificant or discernable effect on the quality of the human environment. Such liquid wastes are also discharged at sea under strict controls. Solid radioactive waste is not dumped at sea. Environ-mental monitoring surveys for radioactivity are periodically performed in harbors where U.S. Naval nuclear-powered ships are built, overhauled or operated. Water samples are taken each quarter year in areas where nuclear-powered ships berth and analyzed for gross radioactivity. No increase of radioactivity above normal background levels has been detected in harbor water where U.S. Naval nuclear-powered ships are based, over-hauled or constructed. Procedures used by the Navy to control discharges of radioactivity have Navy to control discharges of radioactivity have been effective in protecting the environment and the health and safety of the general public. (Nielsen-Florida) W73-01982

INVESTIGATIONS ON THE LOADING OF THE UNTERTRAVE WITH SEWAGE, (IN GER-

MAN), Kiel Univ. (West Germany). Institut fuer Meereskunde. For primary bibliographic entry see Field 05C.

FISH POPULATIONS AROUND EDGEWOOD ARSENAL'S CHEMICAL AGENT TEST AREA, Edgewood Arsenal, Md. For primary bibliographic entry see Field 05C. W73-02021

RADIONUCLIDES IN TRANSPORT IN THE COLUMBIA RIVER FROM PASCO TO VANCOUVER, WASHINGTON, Geological Survey, Portland, Oreg. Water Resources Div.

W. L. Haushild, H. H. Stevens, Jr., J. L. Nelson,

w. L. Flausmid, R. H. Stevens, Jr., J. L. Neison, and G. R. Dempster, Jr.
Available from the National Technical Information Service as TID-25894, \$3.00 in paper copy, \$0.95 in microfiche. Report, 1971. 77 p, 13 fig, 17 tab, 35 ref, 1 append.

Descriptors: *Columbia River, *Radioactive wastes, *Distribution patterns, *Path of pollutants, Sediment transport, Nuclear reactors, Radioecology, Water pollution sources, Suspended solids, Sediment discharge, Discharge (Water), Time series analysis, Chemical analysis, Water analysis, Water sampling, *Washington, Thermal pollution, Public health, Sediment distribution, Particle size, Cobalt radioisotopes, Phosphorus radioisotopes, Zinc radioisotopes, Radioactivity.

Identifiers: Sc-46, Sb-124, Co-58, Co-60, Fe-59, Mn-54, Ba-140, Zr-95, Nb-95, Ruthenium

Mn-54, Ba-140, Zr-95, Nb-95, Ruthenium radioisotopes, Ru-106, Cs-137, P-32, Zn-65, Cr-51, radioisotopes, Ru-100, Cs-137, F-32, Zh-03, Cr-31, Particulate matter, Radioactive decay, Scandium radioisotopes, Antimony radioisotopes, Iron radioisotopes, Zirconium radioisotopes, Barium radioisotopes, Circonium radioisotopes, Chromium radioisotopes Concentrations and discharges of 13 dissolved and particulate radionuclides were observed at Pasco and Vancouver, Washington, for all or parts of the period from January 1964 to September 1966, and at Umatilla, Oregoa, from May 1965 to September 1966. Six gallon samples were collected biweekly, immediately filtered to separate particulate from dissolved radionuclides, and analyzed for concentrations in picocuries/liter water. The radionuclides tested for included Cr-51, Zn-65, Sc-46, Sb-124, Co-58, Co-60, Fe-59, Mn-54, Ba-140, Zr-95, Nb-95, Ru-106, Cs-137, and P-32. A time-series analysis of concentrations and discharges of Zr-95, Nb-95, Ru-106, Cs-137, and P-32. A time-se-ries analysis of concentrations and discharges of eight of the 13 particulate and dissolved radionuclides at Pasco and Vancouver showed a progressive decrease in the concentrations and discharges of many radionuclides during the study period. The decrease was mainly attributable to a decrease in the number of operating reactors. Con-centrations and discharges of the radionuclides varied seasonally in separate pattern that were centrations and discharges of the radionuclides varied seasonally in separate patterns that were used to categorize the particulate and dissolved radionuclides into five classes. Seasonal variations in the discharges of dissolved and particulate radionuclides depended on seasonal variations in their concentrations and the seasonal variation in the water discharge. The hydrodynamic and sedimentation characteristics of the Columbia River and the chemical characteristics of the radionuclides were found to be important factors affecting the disposition in the Pasco-Vancouver reach of the radionuclides discharged at Pasco. (Mackan-Battelle)

THE WEST FALMOUTH OIL SPILL. I. BIOLO-

GY, Woods Hole Oceanographic Institution, Mass. For primary bibliographic entry see Field 05C. W73-02023

THE WEST FALMOUTH OIL SPILL, DATA AVAILABLE IN 1971. II. CHEMISTRY, Woods Hole Oceanographic Institution, Mass. For primary bibliographic entry see Field 05C. W73-02025

A METHOD OF MATHEMATICAL MODELING OF COMPLEX ECOLOGICAL SYSTEMS, O. G. Ivakhnenko, Yu. V. Koppa, M. M. Todua,

and G. P. Kiev. Available from the National Technical Informavion Service as JPRS-55818, \$3.00 in paper copy, \$0.95 in microfiche. JPRS Translation 21 p. 3 fig, 4 tab, 10 ref. Translated from Avtomatika, No 4,

Descriptors: "Mathematical models, "Methodology, "Mathematical studies, "Statistical methods, "Ecosystems, Aquatic life, Aquatic environment, Optimization, Regression analysis, Design, Oxygen, Organic matter, Biomass, Zooplankton, Primary productivity, Fish, Bacteriophage, Diatoms, Cyanophyta, Model studies. Identifiers: "Group data handling, Rybinok reservoir, Variables, Data interpretation, Nonlinear equations, Accuracy, Bebel's theorem, Inorganic matter, Quadratic partial polynomials, Correlation coefficients, Saprophytic bacteria, Permanganate.

The method of group data handling (MGDH) is applied to synthesize a mathematical model for prediction of the quantity of bacteria in the Rybinsk reservoir with an extrapolation time of one year. The method is based on the principle of self-organization at which it is enough to observe only a result near of the characteristic vector. ganization at which it is enough to observe only a small part of the characteristic vector components, as a result of which a complex problem of simulation turns into a comparatively simple one. The heuristic self-organization approach and the method of group data handling make it possible to construct mathematical models of the ecological system valid not only for qualitative but also for quantitative evaluations of any variable which may be of interest. This opens new possibilities for the optimum control of the water reservoir condi-tions. The mathematical model was also con-structed for prediction of the permanganate oxida-tion. (Long-Battelle) W73-42032

INFORMATION ON THE VELOCITY AND FLOW PATTERN OF DETROIT RIVER WATER IN WESTERN LAKE ERIE REVEALED BY AN ACCIDENTAL SALT SPILL,
Toledo Water Div., Ohio.
T. L. Kovacik.
Ohio Journal of Science, Vol 72, No 2, p 81-86, March 1972. 2 fig, 7 ref.

Descriptors: "Water circulation, "Lake Erie, "Path of pollutants, "Tracers, Saits, Sodium chloride, Mixing, Movement, Chlorides, Currents (Water), Limnology.
Identifiers: "Detroit, "Rouge River (Mich).

Identifiers: *Detroit, *Rouge River (Mich).

On December 2, 1970, 20,000 tons of rock salt spilled into the Rouge River, a tributary of the Detroit River. The rate and pattern of flow of the salt into the southern end of the western basin of Lake Erie were measured by monitoring the chloride content of Lake Erie water received at the Toledo Water Treatment Plant. On December 10, 1970, a salt-rich (35 ppm NaCl) water mass, having chloride concentrations twice the normal background, was detected at the Toledo Water Intake. This demonstrated clearly that Detroit River water moves far into the southwestern basin of Lake Erie. After correcting for the time during which the salt mass was in the Rouge River and Detroit River, and the time required for the water to travel from the Intake to the Toledo treatment plant, the velocity of this salt-rich water mass across western Lake Erie, from the mouth of the Detroit River to the Toledo Water Intake, was calculated to be approximately 0.3 feet/second. (K-napp-USGS)

E. COLI AS AN INDICATOR ORGANISM FOR DISINFECTION OF WATER WITH RESPECT TO ENTEROVIRUSES UNDER VARIOUS CON-

Akademiya Meditsinskikh Nauk SSSR. Por primary bibliographic entry see Field 05F. W73-02085

THE STRUCTURE AND FUNCTION OF FRESH--WATER MICROBIAL COMMUNITIES. Virginia Polytechnic Inst. and State Univ. For primary bibliographic entry see Field 05C.
W73-02095

AQUATIC INSECTS OF THE PINE-POPPLE RIVER, WISCONSIN, Wisconsin Dept. of Natural Resources, Madison. For primary bibliographic entry see Field 05C.

PESTICIDES AND FRESHWATER FAUNA, R. C. Muirhead-Thomson. Academic Press, New York. 1971. 248 p.

Descriptors: *Aquatic animals, *Analytical techniques, *Water pollution effects, *Evaluation, *Pesticide toxicity, Pollutant identification, Water pollution sources, Crustaceans, Water quality, Carbamate pesticides, Mollusks, Worms, Laboratory tests, *Pesticide residues, Freshwater fish, Chlorinated hydrocarbon pesticides, Organic Chlorinated hydrocarbon pesticides, Organic Organichosphorus pesticides, Hydrogen ion concentration.

Identifiers: Macroinvertebrates, Mosquito fish, Stizostedion vitreum, Roach, Simulium, Arc-

topsych Bayer Gnats, macroc tatus, worms. deye, A

Data wi pesticid compile on the used or there is achievin many-fa develop tempt h techniq to judge tion from plot or comple ticular pland-B W73-02

> BY MA Georgia For pri EFFEC

AND T MO GA Washir DDT PHYTO PELAC

Stanfo

For pri W73-07 SANIT Drexel A. A. F Availa PB-209 microf

Descri water, gineeri ment, analys On-site studies of Col

Inform

tary la menta southe Bosto were: (2) Te topsyche, Vertebrates, Micropterus salmoides, Bayer 73, Sea lamprey, Fenthion, Niclosamine, Gnats, Beetles, Gamma BHC, Lindane, Lepomis macrochirus, Cyprinus carpio, Icalurus punc-tatus, Corixids, Damselflies, Black flies, Flat-worms, Method evaluation, Golden shiner, Gol-deye, Amphiodon alosoides, Podilymbus gigas, Guppy, Gobio gobio, Azinphosmethyl.

Data which are relevant to a study of the impact of pesticides on animal life in freshwaters have been compiled and summarized with emphasis placed on the methods and techniques which have been used or designed to provide the facts. Because there is a wide range of specialists interested in achieving a correct and scientific evaluation of the many-faceted problem, evaluation techniques and standards tend to be equally diverse, and to have standards tend to be equally diverse, and to have developed independently of each other. An at-tempt has been made to assess these evaluation es, to compare them critically, ar techniques, to compare them critically, and to try to judge the extent to which each phase of evaluation from strictly controlled laboratory tests to plot or field trial, assists in building a true or complete picture regarding the effect of that particular pesticide on the aquatic environment. (Mortland-Battelle)

RELEASE OF DISSOLVED ORGANIC MATTER

BY MARINE MACROPHYTES, Georgia Univ., Athens. For primary bibliographic entry see Field 05C. W73-02100

EFFECTS OF ACUTE GAMMA RADIATION AND TEMPERATURE ON GROWTH AND SUR-VIVAL OF JUVENILE RAINBOW TROUT (SAL-

MO GAIRDNERI), Washington State Univ., Pullman. For primary bibliographic entry see Field 05C. W73-02102

DDT RESIDUES IN COASTAL MARINE PHYTOPLANKTON AND THEIR TRANSFER IN PELAGIC FOOD CHAINS,

Stanford Univ., Calif.
For primary bibliographic entry see Field 05C.
W73-02105

POLLUTION OF SUBSURFACE WATER BY SANITARY LANDFILLS. VOL 2, Drexel Univ., Philadelphia, Pa.

A. A. Fungaroli. A.A. Fungarot.

Availabile from NTIS, Springfield, Va 22151 as PB-209 001, Price \$3.00 paper copy; \$0.95 microfiche. Environmental Protection Agency Report SW-12rg.1, 1971. 216 p. EPA Grant EP-000162.

Descriptors: "Water pollution sources, "Ground-water, "Landfills, "Waste disposal, "Sanitary en-gineering, Path of pollutants, Groundwater move-ment, Soil properties, Geology, Hydrogeology, Water quality control, Hydrologic data, Chemical analysis, Gases, Water temperature, Leachate, On-site investigations, Laboratory tests, Model studies, Northeast U.S., Massachusetts, District of Columbia. of Columbia. Identifiers: *Sanitary landfills.

Information is provided as to the behavior of sani-tary landfills under natural and simulated environtal conditions in an environment common to southeastern Pennsylvania and a large portion of the region between Washington, D.C., and Boston, Massachusetts. The long-range objectives Boston, Massachusetts. The long-range objectives were: (1) To provide means for predicting the movement of pollutants in subsurface regions under existing and proposed sanitary landfill sites. (2) To develop hydrologic, geologic, and soil criteria for the evaluation of site suitability for sanitary landfill operations. (3) To appraise design

methods and remedial procedures for reducing any undesirable contaminant movement. A laboratory and a field sanitary landfill were developed to generate the data needed to attain these long-range objectives. The report consists of three volum objectives. The report consists of three volumes. This (Volume 2) contains the experimental data collected from Oct. 1, 1967, to Dec. 31, 1968. (See also W73-02107 and W72-06103) (Woodard-USGS) W73-02106

POLLUTION OF SURFACE WATER BY SANI-TARY LANDFILLS. VOL 3, Drexel Univ., Philadelphia, Pa. A. A. Fungaroli. Available from NTIS, Springfield, Va 22151 as PB-209 002, Price \$3.00 paper copy; \$0.95 microfiche. Environmental Protection Agency Re-port SW-12rg.2, 1971. 169 p. EPA Grant EP-000162.

Descriptors: "Water pollution sources, "Ground-water, "Landfills, "Waste disposal, "Sanitary en-gineering, Path of pollutants, Groundwater move-ment, Soil properties, Geology, Hydrogeology, Water quality control, Hydrologic data, Chemical analysis, Gasse, Water temporary of the property of the prop analysis, Gases, Water temperature, Leachate, On-site investigations, Laboratory tests, Model studies, Northeast U.S., Massachusetts, District of Columbia.

Identifiers: *Sanitary landfills.

Information is presented as to the behavior of sanitary landfills under natural and simulated environmental conditions in an environment com-mon to southeastern Pennsylvania and a large pornion to southeastern remayatant and a mage por-tion of the region extending between Washington, D.C., and Boston, Massachusetts. The long-range objectives were: (1) To provide means for predict-ing the movement of pollutants in subsurface regions under existing and proposed sanitary landfill sites. (2) To develop hydrologic, geologic, and soil criteria for the evaluation of site suitability for sanitary landfill operations. (3) To appraise design methods and remedial procedures for reducing any undesirable contaminant movement. A laboratory and a field sanitary landfill were developed to generate the data needed to attain these long-range objectives. The report consists of three volume This volume (Volume 3) contains the experimental data collected from Jan. 1, 1969, to Sept. 29, 1969. (See also W73-02106 and W72-06103) (Woodard-USGS) W73-02107

CONTROL OF NITRATE CONTAMINATION OF GROUND WATER ASSOCIATED WITH LAND DISPOSAL OF MUNICIPAL SEWAGE,

LAND DISPUSAL OF MURICIPAL SEWAGE, Michigan Technological Univ., Houghton. Dept. of Civil Engineering. R. C. Polta, and M. C. Wetzel. Available from the National Technical Informa-tion Service as PB-213 265, \$3.00 in paper copy, \$0.95 in microfiche. Institute of Water Research, Michigan State University, Lansing, September 1972. 129 p 24 fig, 6 tab, 58 ref, 2 append. OWRR A-058-MICH (1) 14-31-0001-3522.

Descriptors: *Nitrates, *Municipal water, *Denitrification, *Michigan, Waste disposal, Ion exchange, Organic soils, Organic loading, Adsorp-

Identifiers: *Calumet (Mich), *Land disposal, Adsorption-ion exchange, Nutrient source, Denitrify-ing bacteria, Variable loading rates.

Nitrogen transformations associated with land disposal of a municipal effluent at Calumet, disposal of a municipal effluent at Calumet, Michigan, were investigated. The municipal effluent is applied to alternate ponding sites. The infiltration capacity of the soil permits the system to operate without any effluent. One objective was to investigate the effect of variable loading rates (in terms of gallons/ft sq/day) on the nitrification capacity of the soil in order to determine a loading rate that would limit nitrification but not adversely affect the adsorption-ion exchange of NH3-N and PO4-P. Laboratory batch tests were conducted to determine the NH3-N and PO4-P adsorption-ion exchange capacities of the soil of the Calumet size. Soil columns were dosed with a synthetic waste son columns were dosed with a synthetic waste water from November, 1971, to April, 1972. The loading rates were varied to determine the effect on the nitrification capacity of the soil. In addition, a nitrifying-denitrifying system was operated by using a soil column with an underlying layer of or-ganic soil as a nutrient source for denitrifying bacteria. W73-02111

SALT POLLUTION OF GROUND WATER, Missouri Water Resources Research Center, Rol-

N. Ahmed.
Available from the National Technical Informa-tion Service as PB-213 253, \$3.00 in paper copy, \$0.95 in microfiche. Missouri Water Resources Research Center Completion Report, June 30, 1972. 33 p, 7 fig, append. OWRR B-043-MO (1) 14-31-0001-3298.

Descriptors: *Ground water, Reservoirs, Saline water, *Salinity, *Saline water intrusion, Saline water-freshwater interfaces, *Model studies. Identifiers: Saline mound, *Salt pollution.

An experimental model study was conducted to determine the behavior of induced motion in a salt water body overlain by fresh water. For the study, a narrow tank was constructed from plastic sheets of 0.25-inch thickness. The tank's overall length was 100 inches, its depth, 51 inches, and width, 0.06 inch. Salt water of various concentrations was injected always at the same level in the lower part of the tank. Fresh water, added at the top of the tank, was drawn out under the action of suction head through a 0.25-inch diameter nylon tube fixed nead through a 0.23-inch diameter hylon tube tixed at the top of the tank. For a given concentration, the development of the saline mound to a steady state was recorded for various discharges. The graphic plots for the rise of the saline mounds, the discharges of fresh water, and salt concentrations are nonlinear. The plot of rise versus discharge is concave upward, the one for rise versus concentration is convex downward, and the one for contration is convex downward, and the one for con-centration versus discharge is convex upward. W73-02113

SIGNIFICANCE THE OF STREPTOCOCCI, COLIFORM BACTERIA AND COLIPHAGE IN RELATIONSHIP TO ENTERIC VIRUS POLLUTION IN SEWAGE AND RIVERS. Rhode Island Univ., Kingston. Dept. of Animal

Rhode Island Univ., Kingston. Dept. of Animal Pathology.
P. W. Chang, and V. J. Yates.
Available from the National Technical Information Service as PB-213 269, \$3.00 in paper copy, \$0.95 in microfiche. Rhode Island Water Resources Center, Kingston, Completion Report, July 1972. It p, 2 tab, append. OWRR A-035-RI (1) 14-31-0001-3240.

Descriptors: Coliforms, Viruses, *Bioindicators, Coliforms, Streptococcus, Pollutant identifica-tion, *Aquatic microorganisms, Path of pollutants.

Due to the ease of measurement, the coliform bacdegree of pollution of water with wastes from human or animal sources. The limitation of such a method rests upon the fact that coliform bacteria are normal inhabitants of human or animal bodies and normally are not pathogens. So long as the and normally are not pathogens. So long as the rivers containing large numbers of coliform bacteria are condemned and cleaned, such tests do serve their purpose. But the status of todays rivers in Rhode Island indicates that many are heavily polluted with coliform bacteria; some have coliform counts equal to that of the raw sewage. Provided such an environment does exist, it is important to find out the concentration of viral con-

Group 5B-Sources of Pollution

taminants. The objective was to correlate the con-centration of coliform bacteria, fecal streptococci or coliphage in polluted water to viral pathogens. It was hoped that a correlation could be established between the two, so that the measurement of one would provide a quantitative estimate of the other. From a total of 181 sewage samples studied, no correlation was found between coliform bacteria, fecal streptococci, coliphage and enteric viruses. W73-02119

EFFECT OF POLYMER FERTILIZERS ON THE STRUCTURAL-MECHANICAL PROPERTIES OF SOIL (IN RUSSIAN), For primary bibliographic entry see Field 02G. W73-02140

SURVIVAL AND LEACHING OF FECAL STREPTOCOCCI UNDER FIELD CONDITIONS, Helsinki Univ. (Finland). Dept. of Agricultural Chemistry. I Korkm

J. Korkman. Acta Agral Fenn. 123: p 186-196. 1971. Illus. Identifiers: *Barley-M., *Fecal streptococci, Fer-tilizers, *Leaching, Liquid pig manure, *Helsinki (Finland).

The survival of fecal streptococci from liquid pig manure in cultivated soil was investigated in a field trial with barley in the region of Helsinki, Finland. In the early summer viable bacteria were found In the early summer viable bacteria were found until 6 wk after application of 50 tons/ha manure to the clay soil, and the death rate seemed to be about 63%/wk. Top dressing 12 cm below the soil surface did not affect the death rate. The grain yields increased about 36% due to the placement of the manure. In a leaching experiment 50 tons/ha liquid pig manure was applied on the surface of a clay soil; 3% of the enterococci in the manure was lacked when the field was irrigated for 10 hr. The leached when the field was irrigated for 10 hr. The manure is recommended to be used in spring to avoid the possibility of leaching of viable bacteria.—Copyright 1972, Biological Abstracts, Inc. W73-02143

CONTENTS AND BEHAVIOUR OF MERCURY AS COMPARED WITH OTHER HEAVY
METALS IN SEDIMENTS FROM THE RIVERS
RHINE AND EMS,
Institute for Soil Fertility, Haren-Gronigen
(Netherlands).

(Netnernanus). A. J. de Groot, J. J. M. de Goeij, and C. Zegers. Geologie en Mijnbouw, Vol 50, No 3, p 393-398, May-June 1971. 5 fig, 3 tab, 5 ref.

Descriptors: *Path of pollutants, *Mercury, *Heavy metals, Water pollution sources, Aqueous solutions, Adsorption, Sediment transport, Suspended load, Mud, Clays, Silts. Identifiers: *Rhine River (Neth), *Ems River,

Mercury is one of the various waste substances transported by the Rhine River across the German-Dutch border. Together with a number of other heavy metals mercury is present in large quantities. Upstream these metals are predominantly fixed to the suspended solids in the water and may be deposited on river flats and flood plains. From the fresh-water tidal area of the river onward, however, these elements are solubilized during their transport as organo-metallic complexes. The mobilization of mercury is pronounced, leading to fairly small amounts of this element in sediments from the Wadden Sea. As a counterpart of the Rhine the same processes are described for the Ems River, a classic example of an unpolluted stream. (Knapp-USGS)

A QUANTITATIVE EVALUATION OF DIS-SOLVED OXYGEN INSTRUMENTATION, National Oceanographic Instrumentation Center, Washington, D.C.

B. S. Pijanowski.
In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif: New York, N Y, American Institute of Aeronauthors, November 8-10, 1971, 11 tics and Astronautics, Paper No 71-1053, 1971. 11 p. 23 fig. 2 tab. 7 ref.

Descriptors: "Water analysis, "Dissolved oxygen, "Dissolved oxygen analyzers, "Instrumentation, "Analytical techniques, Reviews, Evaluation, Industrial wastes, Oceanography, Ecology, Water pollution sources.

The implications of the presence of dissolved oxygen in water are discussed in terms of its deleterious or beneficial effects, depending on the functional consequences to those affected, e.g., the industrialist, the oceanographer, and the ecologist. The performance of five commercially available dissolved oxygen meters is examined. The design of each is briefly described. The evaluation program treated a number of parameters and user considerations including an initial check and trial calibration for each instrument and a discussion of the measurement methodology employed. Detailed test results are given relating to the effects of primary power variation, water-flow sensitivity, response time, relative accuracy of dissolved-oxygen readout, temperature accuracy (for solved-oxygen readout, temperature accuracy (for those instruments which included this feature), error and repeatability, stability, pressure and other environmental effects, and test results obother environmental effects, and test results ob-tained in the field. Overall instrument performance is summarized comparatively by chart. (Woodard-W73-02165

A HYBRID COMPUTER PROGRAM FOR PRE-

DICTING THE CHEMICAL QUALITY OF IR-BICATION RETURN FLOWS, Ohio Univ., Athens. Dept. of Civil Engineering. J. L. Thomas, J. P. Riley, and E. K. Israelsen. Water Resources Bulletin, Vol 8, No 5, p 922-934, October 1972. 10 fig. 10 ref.

Descriptors: *Simulation analysis, *Hybrid computers, *Computer programs, *Return flow, *Path of pollutants, Water quality, Water pollution, Water management (Applied), Mathematical models, Ion exchange, Leaching, Percolation, Calcium, Magnesium, Sodium, Sulfates, Chlorides, Bicarbonates, Irrigation water.

A hybrid computer program was developed to pre-dict the water and salt outflow from a river basin duct the water and salt outflow from a river basin in which irrigation is the major user of water. The model combines a chemical model which predicts the quality of water percolated through a soil profile with a general hydrologic model. The chemical model considers the reactions that occur in the soil, including the exchange of calcium, magnesium, and sodium cations on the soil complex, and the dissolution and precipitation of gypsum and lime. The chemical composition of the soil of the property of the soil of the s sum and lime. The chemical composition of the outflow is a function of these chemical processes within the soil, plus the blending of undiverted in-flows, evaporation, transpiration, and the mixing of subsurface return flows with groundwater. The six common ions of western waters, namely calci-um, magnesium, sodium, sulfate, chloride, and bicarbonate were considered in the study. Total dissolved solids outflow was obtained by adding the individual ions. The overall model operates on a monthly time unit. The model was tested on a portion of the Little Bear River basin in northern Utah. The model successfully simulated measured Outn. The model successfully simulated measured outflows of water and each of the six ions for a 24-month period. Preliminary results indicated that the available water supply could be used to irrigate additional land without unduly increasing the sait outflow from the basin. With minor adjustments the model can be applied to other hydrologic areas. (Knapp-USGS) W73-02177 A WATER QUALITY MODEL FOR A CON-JUNCTIVE SURFACE-GROUNDWATER SYSTEM: AN OVERVIEW, Florida Univ., Gainesville. Dept. of Environmen-

tal Engineering. A. I. Perez, W. C. Huber, J. P. Heaney, and E. E.

Pyatt. Water Resources Bulletin, Vol 8, No 5, p 900-908, October 1972. 8 fig, 25 ref.

Descriptors: "Mathematical models, "Conjunctive use, "Lakes, Water pollution sources, "Florida, Surface-groundwater relationships, Rainfall-ru-noff relationships, Percolation, Runoff, Leaching, Base flow, Infiltration, Water management (Ap-plied), Water quality, Path of pollutants, Overland flow, Soil water movement, Groundwater move-

Identifiers: Lake Apopka (Fla).

A mathematical model is designed to predict water quality in a surface-groundwater system. The goal is to obtain cause and effect relationships between pollutant sources and the ensuing concentrations at different locations in a basin. Several programs are used to model rainfall, runoff, flow in surface bodies of water, infiltration, and groundwater flow. At every time step in the simulation, the water quantity computations are performed first. Subsequently, the results of these computations, typically in the form of flow velocities, are used as input to the water quality calculations. The water quality routines involve the modeling of the associated physical, chemical, and biological processes. Emphasis is placed on pollution in agricultural areas. Accordingly the Lake Apopka basin in Central Florida is being used as the application site. (Knapp-USGS) are used to model rainfall, runoff, flow in s W73-02178

POWER SPECTRAL ANALYSIS OF WATER TEMPERATURE FLUCTUATIONS, Tennessee Technological Univ., Cookeville. L. L. Long, J. C. Maxwell, and E. J. Garrison. In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif. New York, N.Y., American Institute of Aeronative Pollutants, November 1, 1971, Palo Alto, Calif. New York, N.Y., American Institute of Aeronative Pollutants, November 1, 1971, Palo Alto, Calif. d Astronautics, Paper No 71-1126, 1971. 5 p, 9 fig. 10 ref.

Descriptors: *Water temperature, *Thermal pollution, *Temporal distribution, *Time series analysis, Annual, Diurnal, *Missouri River, Data collections, Cycles, Stochastic processes, Turbulence, Model studies, Mathematical studies, Rivers. Identifiers: *Power spectral analysis, *Tempera-

Power spectral density techniques are used in the time-series analysis of water temperature records which were taken from the Missouri River. The which were taken from the Missouri River. The resulting spectral plots are broken down into three different frequency ranges corresponding to the Nyquist frequencies which are determined by the selected sample intervals. These frequency ranges are (1) 0-180 cycles/year, (2) 0-720 cycles/year, and (3) 0-630 cycles/hour. Each of the three selected frequency ranges are then used to demonstrate, respectively, their applicability to the study of stochastic modeling, detection and identification of cyclic thermal pollutants, and the analysis of stream turbulence. Temperature measurements were made on the Missouri River at Hermann, Missouri on June 10, 1971. Sample records were taken at three different depths for each of three different stations across the river. The measurements were made from the bridge at Hermann. ments were made from the bridge at Herrmann. The time-series records, when plotted, exhibited pulse-type fluctuations which appeared to be closely related to the velocity of the water. (Woodard-USGS)

MULTIPLE SCATTERING OF LASER LIGHT FROM TURBID WATER, Bell Telephone Labs., Inc., Whippany, N.J.

V. L. Gr. D. L. Fei In: Joint Pollutan New Yo 10 fig, 20

Descripto technique penetrati tions, (craft, Ac Identific

cal mode tions of s sorb ligh a quantit lakes and Laser lig two spe Teflon p black dy range of radiance dicted by develops tions of cluded n correlati ticles. (V W73-021

WATER Bendix Mich. For print W73-021

WATER AND R OHIO, Ohio Sta Ohio Jo Septemb Descript

sources,

water, Chloride caused I wastes problem evapora type of cleansin decrease centratio

natural hydroge rate of will retu

rately as W73-021 KINETI TION S TY AND For prin W73-022

ANALY BON PI

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Sources of Pollution—Group 5B

V. L. Granatstein, M. Rhinewine, A. M. Levine, D. L. Feinstein, and M. J. Mazurowski. In: Joint Conference on Sensing of Environmental Pollutants, November 8-10, 1971, Palo Alto, Calif: New York, N.Y., American Institute of Aeronautics and Astronautics, Paper No 71-1098, 1971. 8 p, 10 fig. 20 ref.

Descriptors: "Water pollution sources, "Tracking techniques, "Remote sensing, "Turbidity, "Light penetration, Theoretical analysis, Data collections, Correlation analysis, Model studies, Methodology, Path of pollutants, Evaluation, Aircraft, Aerial photography.

Identifiers: "Laser light.

Through a controlled laboratory study, a theoreti-cal model was developed which accurately relates the reflectance of turbid water to the concentra-tions of suspended materials which scatter and ab-sorb light. Such a model will be useful in obtaining sorb tight. Such a model will be useful in obtaining a quantitative mapping of pollutant distributions in lakes and rivers from aerial photographic surveys. Laser light was shone on turbid water containing two species of 'pollutant'—a polydispersion of Teflon particles which scattered the light, and a black dye which absorbed the light. Over a large range of 'pollutant' concentrations, the measured radiance of scattered light was successfully predicted by the theoretical analysis. The theoretical development involved obtaining appropriate soludevelopment involved analysis. The theoretical development involved obtaining appropriate solu-tions of the radiative transport equation, and in-cluded modelling of certain special effects such as correlation in scatterings from closely spaced par-ticles. (Woodard-USGS) W73-02181

WATER QUALITY MEASUREMENTS WITH AIRBORNE MULTISPECTRAL SCANNERS, Bendix Aerospace Systems Div., Ann Arbor,

For primary bibliographic entry see Field 05A. W73-02182

WATER POLLUTION BY OIL-FIELD BRINES AND RELATED INDUSTRIAL WASTES IN OHIO, Ohio State Univ., Columbus. Dept. of Geology.

Onto Journal of Science, Vol 71, No 5, p 257-269, September 1971. 11 fig, 6 ref.

Descriptors: *Water pollution, *Water pollution sources, *Waste water disposal, *Brines, Ground-water, Surface water, *Industrial wastes, Chlorides, *Ohio, Brine disposal.

Contamination of ground and surface waters caused by the disposal of industrial high chloride wastes and oil field brines has been a major problem in many areas of Ohio. The use of brine evaporation pits has been a major cause of this type of pollution. Although time and natural cleansing have caused the chloride content to decrease greatly in many contaminated areas, concontrations in other areas has increased. Since natural flushing depends on several various hydrogeologic factors as well as the amount and rate of rain, the time when a contaminated area will return to its original condition can not be accurately ascertained. (Albert-Texas)

KINETICS OF ALGAL BIOMASS PRODUC-TION SYSTEMS WITH RESPECT TO INTENSI-TY AND NITROGEN CONCENTRATION, California Univ., Berkeley. For primary bibliographic entry see Field 05C. W73-02218

ANALYSIS OF CHLORINATED HYDROCAR-BON PESTICIDES IN WATERS AND WASTE-

WATERS, Department of the Environment, Ottawa (On-tario). Inland Waters Branch.

For primary bibliographic entry see Field 05A. W73-02313

STUDY OF THE THERMAL REGIME OF RIVERS (OB IZUCHENII TERMICHESKOGO REZHIMA REK), Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR).

For primary bibliographic entry see Field 04A.
W73-02336

NOTE ON THE FINITE ELEMENT SOLUTION OF THE DIFFUSION-CONVECTION EQUA-TION, Alaska Univ., College. Inst. of Water Resources.

For primary bibliographic entry see Field 02E.

MASS BALANCE MODEL OF TRACE A MASS BALANCE MODEL OF TRACE METALS IN SEVERAL DELAWARE WATERSHEDS-A PROGRESS REPORT, Delaware Univ., Newark. Dept. of Geology; and Delaware Univ., Newark. Coll. of Marine Studies. R. B. Biggs, J. C. Miller, and M. J. Otley. Delaware Water Resources Center Progress Report, June 1972. 34 p, 8 fig, 1 tab, 9 ref. 4 append. OWRR A-018-DEL (1).

Descriptors: *Trace elements, *Heavy metals, *Water pollution sources, *Path of pollutants, *Watersheiz (Basins), Input-output analysis, Hydrologic data, Data collections, Rainfall, Soils, Aquifer characteristics, Runoff, Groundwater movement, Streamflow, Flow rates, Analytical techniques, Cadmium, Lead.

A simple input-output model of the source and sinks of trace metals in a watershed is illustrated. In an unconfined aquifer whose source of recharge is precipitation on the watershed, it is possible to identify several potential sources or sinks of trace metals as water moves through the system. These include metals carried by precipitation, metals contained in the soil zone as a result of the activicontained in the soil zone as a result of the activities, and metals contained in the minerals of the sediments below the soil zone and above or below the water table. The water discharged from the aquifer will have a composition of trace metals reflecting the multitude of geochemical conditions which can occur between the areas where precipitation and discharge occur. The concentration of trace metals discharge occur. The concentration of trace metals in the stream as baseflow represents the sum of the contributions or withdrawals from the rain, soil, and aquifer. Hydrologic data used for the model study were collected in several small watersheds in south-central Delaware. (Woodard-watersheds in south-central Delaware.) W73-02341

A SURVEY OF THE BENTHIC MACROINVER-TEBRATE POPULATIONS IN THE ENGINEER TERRATE POPULATIONS IN THE NEW HOPE AND LOWER HAW RIVERS, North Carolina Univ., Chapel Hill. Dept. of En-vironmental Sciences and Engineering.

T. W. Yocum.

M.S. Thesis, 1972, 46 p, 9 fig, 4 tab, 35 ref, 3 append. OWRR A-056-NC (2).

Descriptors: *Benthos, *Aquatic environment, *Riological communities, *Limnology, *Water Descriptors: "Bentios, "Aduatic environment, 'Biological communities, "Limnology, "Water pollution effects, "North Carolina. Identifiers: "New Hope River (NC), "Haw River (NC), "Cape Fear River (NC).

The intent is to describe the benthic macroinvertebrate communities at several points along the main streams and tributaries of the New Hope and lower Haw Rivers. Studies of the water quality of these streams have shown them to be polluted to varying degrees. Rock-filled artificial substrate samplers were used to collect benthic organisms over a period of one year. Parameters used to compare the communities at the various sampling sta-

tions included several measures of comm diversity, size, and tolerance to pollution. The results show definite differences between the main stem and tributary streams of each river system. Water quality, bottom type, and rate of flow appear to be important limiting factors for benthic organisms in these streams. It is concluded that water quality is a more important limiting factor in the New Hope River than in the lower Haw River.

HEAVY METAL ANALYSES OF FRESHWATER MACROINVERTEBRATES FROM THE LOWER HAW AND NEW HOPE RIVERS, North Carolina Univ. Chapel Hill. Dept. of Environmental Sciences and Engineering. For primary bibliographic entry see Field 05A. W73-02356.

WATER WELLS AND GROUND WATER CON-

TAMINATION, Bureau of Reclamation, Denver, Colo. H. H. Ham.

Bulletin of the Association of Engineering Geologists, Vol 8, No 1, p 79-90, Spring, 1971. 4 fig, 3

Descriptors: *Water wells, *Water pollution sources, Drilling, Consumption use, *Construc-tion materials, Well casings, Corrosion, Legal aspects, Legislation, Sampling, Water quality, *Pollution abatement, Grouting. *Pollution abatement, Grouting. Identifiers: *Sanitary practices, *Groundwater contamination, Water well technology.

The faulty water well is shown to be a source of groundwater contamination in areas of concentrated usage. Contributing to the problem of groundwater contamination through water wells are: (1) public and water well industry misconcepture. tions regarding groundwater; (2) lack of regulation and enforcement; and (3) the out-of-sight, out-ofand enforcement; and (5) the out-on-sign, out-on-mind nature of wells. Legislative and administra-tive steps for coping with problems of well-in-duced groundwater contamination are recom-mended, along with some research and developmenueu, atong with some research and develop-ment needs, such as improved drilling methods, improved sampling techniques for aquifer materi-als, and reliable design criteria. (Campbell-NWWA) W73-02413

WATER QUALITY CHANGES IN THE DISTRIBUTION SYSTEM,
Mississippi State Univ., State College. Dept. of
Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-02430

FISHERIES, COOLING-WATER DISCHARGES AND SEWAGE AND INDUSTRIAL WASTES, Water Pollution Research Lab., Stevenage (England). For primary bibliographic entry see Field 05C. W73-02433

METHODS FOR ORGANIC PESTICIDES IN WATER AND WASTEWATER. National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab. For primary bibliographic entry see Field 05A. W73-02436

GROUNDWATER RECHARGE AND QUALITY TRANSFORMATIONS DURING INITIATION OF A NEW SEWAGE STABILIZATION POND (AND MANAGEMENT), Arizona Water Resources Research Center, Tuc-

son. L. G. Wilson, and R. A. Phillips.

Group 5B-Sources of Pollution

Available from the National Technical Informa-Avanable from the National Technical Informa-tion Service as PB-213 333, \$3.00 in paper copy, \$0.95 in microfiche. Partial Completion Report, August 1972, 6 p. OWRR A-025-ARIZ (1). 14-31-0001-3503.

Descriptors: *Oxidation lagoons, *Seepage, *Deep percolation, *Nitrification, *Denitrification, Path of Polhutants, Leaching, Nitrates, E. Coli, Chemical oxygen demand, *Groundwater recharge, *Anizona.

[Jentifiers: *Tucson (Ariz), Fecal coliforms.

Raw sewage was metered into a newly-constructed lagoon of the Pima County Department of Sanitation, Tucson, Arizona. Seepage losses were calculated from data on inflow, evaporation and change in storage. Water samples were obtained from shallow suction cups, a 40-ft and a 60-ft PVC well and a 100-ft access tube, all located inside the lagoon. Samples from these wells together with well and a 100-ft access tube, all located inside the lagoon. Samples from these wells, together with water samples from the lagoon, were examined for coliform organisms and various physical and chemical constituents. Of special concern were transformation in nitrogen. Estimated seepage rates in the lagoon during inundation ranged from 0.20 ft per day to 0.10 ft per day. Water level observations in wells reflected the percolation of effluent to the water table, 70 ft below land surface. Initially, the nitrate ion levels in the suction cup samples were high, manifesting the leaching of indigenous soil nitrogen. With the onset of anaerobic conditions at the base of the lagoon, nitrification was inhibited at the soil surface and ammonia became the predominant form of nitrogen in the soil solution. Sorption of ammonium ion appeared to occur on clay particles in a soil zone of high cation exchange capacity. There were no undesirable tion exchange capacity. There were no undesirable microbial or chemical effects of recharge from lagoon seepage on native groundwater quality. (See also W73-02439 and W73-02440)

GROUNDWATER RECHARGE AND QUALITY TRANSFORMATIONS DURING INITIATION AND MANAGEMENT OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Dept. of Soils, Water and

Engineering.

Engineering. G. V. Johnson, and R. C. Sidle. Partial Completion Report, August, 1972, 3 p. OWRR A-025-Ariz (2).

Descriptors: *Sewage effluent, *Recycling. *Water pollution sources, *Turf grasses, *Nitrogen, Soils, *Groundwater recharge.

Soil-turfgrass systems were evaluated to determine their ability to utilize and purify municipal sewage effluent. The systems were found to be highly effective in removing nitrogen from the efnighty effective in removing introgen from the effuent. Purification efficiencies for nitrogen ranged from 91.5 to 96.9% for high and low irrigation rates respectively. Over a 30-week study period as much as 40.6% of the applied effluent move below the root zone and was considered available for ground water recharge. The average NO3 (-)-N content in the recharge water was 40 times less than the U.S. Public Health Service limits. Nitrogen utilization by the turfgrass was as great from effluent as from fertilizer sources. Results suggest irrigation of turfgrasses would be Results suggest intigation to unigrasses would be an excellent use for effluent in the southwest since grasses can be grown all year, demands on domestic water supplies would be reduced and recharge of good quality ground water may result. (See also W73-02438) (See also W W73-02439

EVALUATION OF A TURFGRASS-SOIL SYSTEM TO UTILIZE AND PURIFY WASTE Arixona Univ., Tucson. Dept. of Soils, Water and

Engineering. R. C. Sidle, and G. V. Johnson.

Partial Completion Report (1972), 13 p, 3 fig, 1 tab, 12 ref. OWRR A-025-ARIZ (3).

Descriptors: Wastes water disposal, Pollution abatement, Turfgrasses, Soil-water-plant relation-ships, Nitrogen, Sewage effluent, Groundwater recharge. recharge. Identifiers: *Tucson (Ariz), Sewage utilization.

Soil-turfgrass systems were evaluated to determine their ability to utilize and purify municipal sewage effluent. The systems were found to be sewage etituent. Ine systems were found to be highly effective in removing nitrogen from the effuent. Purification efficiencies for nitrogen ranged from 91.5 to 96.9% for high and low irrigation rates respectively. Over a 30-week study period as much as 40.6% of the applied effluent moved below the root zone and was considered available for ground water recharge. The average NO3-N content in the recharge water was 40 times less than the U.S. Public Health Service limits. Nitrogen utilization by the turfgrass was as great from effluent as from fertilizer sources. Results suggest irrigation of turfgrasses would be an excel-lent use for effluent in the southwest since grasses can be grown all year, demands on domestic water supplies would be reduced and recharge of good quality ground water may result. (See also W73-W73-02440

THE INFLUENCE OF MIST IRRIGATION ON THE POTATO: III. NUTRIENT CONTENT OF Minnesota Univ., St. Paul. Dept. of Horticultural

Science. For primary bibliographic entry see Field 03F. W73-02442

AN APPRAISAL OF THE PCB SITUATION IN THE STATE OF WISCONSIN, Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 05C. W73-02447

KINETICS OF BACTERIAL GROWTH DURING AEROBIC OXIDATION OF ORGANICS, Rhode Island Univ., Kingston. For primary bibliographic entry see Field 05C. W73-02449

KINETICS OF BIOLOGICALLY MEDIATED AEROBIC OXIDATION OF ORGANIC COM-POUNDS IN RECEIVING WATERS AND IN WASTE TREATMENT, Harvard Univ., Cambridge, Mass. For primary bibliographic entry see Field 05C. W73-02450

MATHEMATICAL DESCRIPTION OF BIOLOG-ICAL AND PHYSICAL PROCESSES IN HEATED STREAMS, Rutgers - The State Univ., New Brunswick, N.J. For primary bibliographic entry see Field 05C. W73-02468

ROLE OF PHOSPHORUS IN EUTROPHICA-TION AND DIFFUSE SOURCE CONTROL, Wisconsin Univ., Madison. Water Chemistry Program. For primary bibliographic entry see Field 05C. W73-02478

HYDROCHEMICAL STUDY OF THE NATIONAL REACTOR TESTING STATION STATION. Geological Survey, Menlo Park, Calif. R. Schoen.

Reprint of Paper from 24th International Geological Congress, Section 11, Hydrogeology, p 306-314, Montreal 1972. 3 fig, 2 tab, 14 ref.

Descriptors: *Groundwater recharge, *Water chemistry, *Nuclear reactors, *Idaho, *Thermal water, Chemical reactions, Water analysis, Chemical analysis, Analytical techniques, Deep wells, Hydrogeology, Waste disposal, Injection wells, Water pollution sources, Thermodynamic Identifiers: *National Reactor Testing Station

Distinctive chemical compositions serve to identify four potential sources of recharge to groundter beneath the eastern Snake River Plain of water beneath the eastern Snake River Plain of Idaho. Only two of these sources contribute significant recharge to the groundwater beneath the National Reactor Testing Station (NRTS). Chemical compositions of deep groundwater and hot springs provide clues to subsurface lithology not yet clarified by drilling. Thermodynamic analysis of the data indicates the possibility of precipitation of calcite and dolomite during utilization of the groundwater or during disposal of waste. Waters at the NRTS approach saturation with respect to calcite and dolomite and slight supersaturation occurs in groundwater from the northwest part of the station. This means that groundwater must be utilstation. This means that groundwater must be utilstation. This means that groundwater must be utilized with care in order to prevent deleterious precipitation of solids during use, as in cooling towers. Subsurface disposal of liquid waste with a high pH into groundwater will cause rapid precipitation and possibly well plugging. Disposal of high-sodium wastes into the sediment-rich parts of the geologic section will cause release of calcium and magnesium held by natural ion-exchange on montmorillonitic clays. The additional calcium and magnesium in solution might initiate precipita-tion of calcite or dolomite with consequent plugging. (Woodard-USGS) W73-02484

ENVIRONMENTAL QUALITY. A CHALLENGE FOR ACHIEVEMENT, Datatronic Systems Corp., Panorama City, Calif. Computer Sciences and Environmental Technology Div. For primary bibliographic entry see Field 05G. W73-02485

PROCEEDINGS, FOURTEENTH CONFERENCE ON GREAT LAKES RESEARCH. For primary bibliographic entry see Field 02H. W73-02498

AN INVESTIGATION OF HORIZONTAL DIF-FUSION IN LAKE ONTARIO, Canada Dept. of Energy, Mines and Resources, Burlington, Ontario, Inland Waters Branch. De-partment of Energy, Mines and Resources, Burlington (Ontario). Canada Centre for Inland

Waters.
For primary bibliographic entry see Field 02H. W73-02507

MICROBIAL DEGRADATION OF PESTICIDES IN AQUEOUS SOLUTIONS, Sverdrup, Parcel and Associates, Inc., St. Louis, Mo. H. G. Schwartz, Jr.

Journal Water Pollution Control Federation, Vol 39, No 10, p 1701-1714, Oct 1967. 6 fig, 1 tab, 17

Descriptors: *Water quality control, *Water pollution sources, *Pesticide residues, Toxins, Degradation, *Microbial degradation, 2-4-D, Degradation, *M Aqueous solutions. Identifiers: *CIPC.

the pest bamate acid (2,4 tracer to 2,4-D w microbia mineral acid por solution tional s degraded isopropy complete atoms in percent tion. (Be W73-025

A SOUR Y. P. Hs M. S. Th

Descript Identifie Measure tent of the

selected

type of s show the forest be the lowe ley floor was an i content a The min silts wer of the su East Gal ful indica clay in a system. water sa sources system a W73-025

5C. E

A STUI DEVELO Georgia M. A. Mo Available on Ser \$0.95 in Resource Septemb GA (1).

Descript level, *T level, *T ties, *Di lakes, A tion, Pr Recreation tive hete

major (12

The microbial degradation in aqueous solution of the pesticides isopropyl N- (3-chlorophenyl) carbamate (CIPC) and 2,4-dichlorophenoxyacetic acid (2,4-D) was studied by means of radioactive scid (2,4-D) was studied by means of radioactive tracer techniques and ultraviolet spectroscopy. 2,4-D was found to be strongly resistant to microbial decomposition in a liquid medium of mineral salts. Less than 40 percent of the acetic acid portion of the molecule disappeared from solution in 6 months, even in the presence of additional sources of organic carbon. CIPC was degraded much more rapidly than 2,4-D. The isopropyl segment of the CIPC molecule was completely metabolized. Metabolism of the carbon atoms in the ring structure ceased after 40 to 60 atoms in the ring structure ceased after 40 to 60 percent of the atoms had disappeared from solution. (Bean-AWWARF) W73-02534

A SOURCE STUDY OF THE SUSPENDED SOLIDS IN THE GALLATIN RIVER, Montana State Univ., Bozeman.

M. S. Thesis, August 1971. 96 p. 14 fig, 12 tab, 46 ref. OWRR A-041-MONT (2).

Descriptors: *Silts, *Water pollution sources, *Soil chemistry, *Sediments, *Suspension, *Sediment load, *Montana, Clays, Suspended solids. Identifiers: *Gallatin River (Mont).

Measurements were made of the silt and clay con-tent of the Gallatin River and its tributaries during selected periods of the year to trace the source and type of sediments. The silt and clay measurements ow that Taylor Fork was the main source of the show that raylor fork was the main source of the silt and clay found in the Gallatin River above the forest boundary. The suspended silt and clay of the lower Gallatin River, which is in the broad valley floor, was increased by the local erosion and the contribution of the East Gallatin River. There was an inverse relationship between dissolved salt content and suspended solid content of the stream. The mineral patterns of the suspended clays and silts were used as indicators in tracing the source of the suspended silt and clay in the Gallatin and East Gallatin rivers. The clay minerals were help-East Gallatin rivers. The clay minerals were neigh-ful indicators for determining the source of sit and clay in a stream. The mineral tracing technique could not work well in a large or complex source system. In case of this complication, additional water samples of the main stream between the sources need to be taken in order to simplify the system and make interpretation clearer. (Holje-Montana) W73.07559 Montana) W73-02559

5C. Effects of Pollution

A STUDY OF THE EFFECTS OF ISLAND DEVELOPMENT ON LAKE WATER QUALITY, Georgia Inst. of Tech., Atlanta. Environmental

Georgia Inst. of Tech., Auanta. Environmental Resources Center. M. A. McClanahan, and A. W. Hoadley. Available from the National Technical Information Service as PB-213 161, \$3.00 in paper copy, \$0.95 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-1172, September 1972, 49 p, 5 fig, 11 tab. OWRR A-034-11.

Descriptors: Water pollution effects, *Trophic level, *Thermal stratification, *Recreational facilities, *Dissolved oxygen, Water quality, Artificial lakes, Average flow, Density currents, Denadation, Primary productivity, Light penetration, Limnology, Mesotrophy, Freshwater, *Georgia, Recreation, Secchi disks, Sedimentation. Identifiers: Chattahoochee River, *Lake Sidney Lanier (Geo, Subtropical monomictic lake, Positive heterograde, Residence time.

Seasonal limnological changes in the vicinity of a major (120 acres) recreational facility on Lake Sid-

ney Lanier, Georgia were studied from November, 1970 to November, 1971. During the November, 1970 to November, 1971. During the study period only the beginning phases of construction occurred (clearing and grading land, road construction and utility installation). Parameters measured included: temperature, dissolved oxygen, pH, Secchi disk transparency, and iron and nitrate concentrations. A positive heterograde oxygen profile with the maximum in the metalimnion developed during summer stratification. This type ygen profile with the maximum in the metalimnion developed during summer stratification. This type oxygen profile was found both around the construction site and in the open lake. Occurrence of this type of profile at both locations indicates that the lake water contained the nutrients necessary for the production of oxygen. They were not washed into the lake from the construction site. The only detectable influence of the construction activity at the site on lake water quality was siltancitying at the site on lake water quality was siltancity of the site of the construction. ane only detectable influence of the construction activity at the site on lake water quality was siltation of some of the bays near where large areas of land had been cleared and the soil disturbed. Analysis of the available data indicates that the part of Lake Lanier studied could be classified as mesotrophic. However, it could be caused to become eutrophic in a rather short period of time of the indicates that the part of the country is the country of the country o if the influent waters are allowed to be degraded by man-made wastes. W73-01954

AN ECOSYSTEMATIC STUDY OF THE SOUTH

AN ECOSYSTEMATIC STUDY OF THE SOUTH RIVER, VIRGINIA, Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources ResearchCenter. J. Cairns, Jr., and K. L. Dickson. Available from the National Technical Informa-

Ovanuable from the National Technical Information Service as PB-213 159, 33.00 in paper copy, 80.95 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 54, July 1972. 104 p., 5 fig, 11 tab, 22 ref, append. OWRR A-999-Va (15).

Descriptors: *Biological properties, *Ecosystems, *Rivers, *Virginia, *Water pollution effects, Surveys, Sampling, Data collections, Industrial wastes, Agricultural runoff, Domestic wastes, Ecology, Fish, Algae, Aquatic plants, Protozoa, Bacteria, Streamflow, Flow rates, Water temperature, Water chemistry, Chemical analysis, Nutrients.

Identifiers: *South River (Va).

A biological survey of the fish, macroinver-tebrates, algae, aquatic plants, protozoans, and bacteria was conducted on the South River, Virpacteria was conducted on the South River, virginia, in September 1970. The purpose of this survey was to measure the ecological condition of a system receiving agricultural, domestic, and industrial wastes. Samples were collected at 8 sites to determine the effects of various wastes on the biota of the South River. The fauna and flora at each station were examined to determine the diversity, density, and distribution of aquatic life in relation to physical and chemical water quality. The discharge of domestic and industrial wastes in Waynesboro, Virginia (1) exceeded the waste as similative capacity of the river and caused the dis-solved oxygen to be entirely depleted in certain reaches of the river at times of low flow and high temperature; (2) enriched the system by adding nutrients such as carbon, phosphorus, and nitrogen, causing a definite shift in the composi-tion of the flora; and (3) decreased the diversity of tion of the Hora; and (3) decreased the diversity of fish and macroinvertebrates and caused qualitative shifts in algae, higher plants, bacteria, and protozoans when compared to areas of the South River upstream of Waynesboro. The biological recovery was not complete fourteen miles downstream of Waynesboro at Harriston, Virginia. (Woodard-USGS)

CHEMICAL RESPONSES BY MARINE ORGAN-ISMS TO STRESS, STRESS IN HARD CLAMS FROM A POLLUTED ESTUARY, Rhode Island Univ., Kingston. Graduate School of Oceanography. H. P. Jeffries.

Available from the National Technical Informa-tion Service as PB-213 193, \$3.00 in paper copy, \$0.95 in microfiche. Environmental Protection Agency, Report. Number EPA-R3-72-017, December 1971. 27 p, 2 fig, 6 tab, 24 ref. Project EPA 1835-0.DTX.

Descriptors: "Amino acids, "Lipids, "Estuarine environment, Mollusks, Diseases, "Clams, Amino acids, Estuaries, Oil wastes, Water pollution ef-fects, "Carbohydrates, Organic wastes, Identifiers: "Fatty acids, Homeostasis, Mer-cenaria mercenaria, Glycine, Taurine, Alanine.

The hard clam, Mercenaria mercenaria, shows a general response to environmental variation. The molar ratio of free taurine to glycine in gill and mantle tissues climbs above 3, while alpha-amino acids and carbohydrates decrease. Subtle adjustacids and carbohydrates decrease. Subite adjust-ments in the total pattern of free amino acids and fatty acids also accur, but these can be readily seen by changes in biochemical diversity and equitability. In an estuary long suffering from hydrocarbons and other agents in petroleum products and sewage, high mortality results from a culmination of natural responses superimposed on abnormal complications. The process apparently starts after a black, polymeric irritant collects in epithelial tissue and eventually occludes the renal dac. This leads, indirectly, to infestations of a dac. This leads, indirectly, to infestations of a parasitic polychaete that is rarely found in hard clams. A syndrome with many facets soon becomes clear, but the situation can be identified occurates crear, but the situation can be identified and its results predicted by simply observing the responses of taurine and glycine in stressed and normal populations. (EPA abstract) W73-01975

WATER QUALITY CRITERIA DATA BOOK -VOLUME 3: EFFECTS OF CHEMICALS ON AQUATIC LIFE, SELECTED DATA FROM THE LITERATURE THROUGH 1968. Battelle Memorial Inst., Columbus, Ohio.

Copy available from GPO Sup Doc as EP1.16:18050GWV 05/71/v3, \$3.75; microfiche from NTIS as PB-213 210, \$0.95. Environmental Protection Agency, Water Pollution Control Research Series, May 1971. 528 p, 1 fig, 10 tab, 961 ref, 4 app. EPA Program 18050 GW V0 05/71 68-

Descriptors: *Toxicity, Reviews, *Bioassay, *Industrial wastes, *Pesticides, *Aquatic organisms, *Pest control, *Chemcontrol, *Bibliographies, *Data collections, *Water pollution effects, Documentation, Publications, Pesticide toxicity, Bioindicators, Agricultural chemicals, Fish, Chemicals, chemical wastes, Biochemical oxygen demand, Bacteria, Algae, Aquatic fungi, Invertebrates, Aquatic insects, Oysters, Shrimp. Identifiers: Summaries.

Original data from more than 500 technical publications concerning the specific effects of chemicals on individuals species of aquatic biota were collected and summarized in uniform format. Alphabetical assembly of the data by chemical allows rapid access to considerable detailed information. A species index facilitates search for information on the toxicity of chemicals to in-dividual aquatic species. The details of major procedures in laboratory bioassay and field assessment of chemical toxicity in water are discussed. Freshwater and marine procedures are included. A total of 961 references were utilized. Recommendations include: (1) establishment of an information-analysis center on chemical water pollution based to some extent on the report prepared, (2) preparation of a listing of chemical constituents of effluents and continued up-dating of this list, (3) Development of a pattern of bioassays for evaluations. Development of a pattern of bioassays for evaluating the effects of a chemical on aquatic life. (Data from these evaluations would be used in developing mathematical models for predicting chemical toxicity in a wide range of environmental circumstances). (4) development of in situ bioassay

Group 5C-Effects of Pollution

procedures for more realistic assessment of chemical toxicity to aquatic life. (See also W72-08157 and W72-08158) (LeGore-Washington)

A SIMPLE APPARATUS FOR MEASURING AC-TIVITY PATTERNS OF FISHES, Kansas Univ., Lawrence.

For primary bibliographic entry see Field 05A. W73-01977

EFFECT OF DONETSK MINERAL WATER ON THE CLINICAL COURSE OF CHRONIC CHOLANGIOHEPATITIS, (IN RUSSIAN), Gosudarstvennyi Meditsinskii Institut, Donetsk (USSR).

A. Y. Gubergrits, N. A. Gubarenko, and B. I.

Vrach Delo. 10. p 25-27. 1971. English summary. Identifiers: *Public health, Donetsk, *Hepatitis, *Mineral water, USSR, Beneficial uses.

Examination of 150 patients with chronic cholan-giohepatitis revealed that treatment with Donetsk mineral water resulted in a marked clinical improvement (disappearance of pain, reduction of the liver size, amelioration of digestion etc.) and an improvement of the physico-chemical proper-ties of the bile. Donetsk mineral water should be used in clinical and out-patient conditions.—Copyright 1972, Biological Abstracts, Inc. W73-02002

INVESTIGATIONS ON THE LOADING OF THE UNTERTRAVE WITH SEWAGE, (IN GER-

MAN), Kiel Univ. (West Germany). Institut fuer Meereskunde.

R. Kaendler. Kiel Meeresforsch. Vol 27, No 1, p 20-27, 1971. Il-

New Maps. English summary.

Identifiers: *Baltic Sea, *Germany, Nutrients,
*Sewage, Stratification, *Untertrave, Wastes,
*Organic loading.

In connection with investigations on the effects of sewage in coastal waters of the Western Baltic a report is given on the situation in the Untertrave in Aug. 1967. A longitudinal section through the river-like fjord, 25 km in length with low fresh H2O influx and marked salinity stratification, demonstrated that the H2O condition in this outlet showed no improvement compared with the situation in 1950, despite the renovation of the canal. Water poor in O2 or poisoned by H2S and en-riched with nutrients still dominated the upper part within the region of the Hanse town of Lubeck; only in the lower part was the reduction of the pol-lution proceeding gradually by mixing with the in-flowing Baltic Sea water.—Copyright 1972, Biolog-ical Abstracts, Inc. W73-02016

DETERMINATION OF MANGANESE, COPPER, AND IRON IN HUMAN BLOOD BY NEUTRON ACTIVATION ANALYSIS, Reactor Centrum Nederland, Petten.

For primary bibliographic entry see Field 05A. W73-02018

EFFECT OF DRINKING WATER WITH DIF-FERENT CHLORIDE CONTENTS ON EXPERI-MENTAL ANIMALS, (IN RUSSIAN), Institute of General and Municipal Hygiene,

Moscow (USSR). V. K. Fadeeva. Gig Sanit. Vol 36, No 6, p 11-15. 1971. Illus. En-

glish summary. Identifiers: Animals, *Chloride, *Hypertension, *Sodium chloride water, *Potable water.

An excessive intake of NaCl promoted the development of a state of hypertension in experimental animals. NaCl content of drinking water exceeding 2.5 g/l produced a distinct hypertensive effect. Drinking water containing chlorides at concentrations near 1 g/l had no effect on the development of experimental hypertension and caused no changes in water-salt metabolism.—Copyright 1972, Biological Abstracts, Inc.

FISH POPULATIONS AROUND EDGEWOOD ARSENAL'S CHEMICAL AGENT TEST AREA, Edgewood Arsenal, Md.
H. J. Speir.
Available from the National Technical Information Service as AD-740 735, \$3.00 in paper copy, \$0.95 in microfiche. Technical Report No EATR-4609, March 1972. 25 p, 6 fig, 2 tab, 8 ref.

Descriptors: "Fish populations, "Growth rates, "Water pollution effects, "Chemical wastes, Distribution patterns, Marine fish, Sampling, Estuaries, Water pollution sources, Nets, Ecological distribution, Freshwater fish, On-site tests, Chesapeake Bay, Killifishes, White perch, Yellow perch, Carp, Carpsucker, Mathematical models, Industrial wastes, Silversides, Sunfishes, Dartes, Identifiers: Carroll Island, Shannon-Wiener index, Senting Spacing discretis Menodia Manhey. Identifiers: Carroll Island, Shannon-Wiener index, Seining, Species diversity, Menedia, Membras, Carpiodes spp, Notropis spp, Myriophyllum spicatum, Anchovy, Alewife, Spottail shiner, Brown bullhead, Needlefish, American eel, Golden shiner, Pipefish, Black crappie, Bluefishes, Hawthorne Cover, Carroll Point, Gizzard shad, Anchoa mitchilli, Marone americana, Alosa pseudoharengus, Lepomis gibbosus, Fundulus spp, Perca flavescens, Marone saxatilis, Alosa aestivalis, Notropis hudsonius, Notemigonus crysoleucas, Ictalurus nebulosus, Stronglylura marina, Anguilla rostrata, Dorosoma cepedianum, Cyprinus carpio, Trinectes maculatus, Typrinus carpio, Trinectes maculatus, Etheostoma nigrum, Syngnathus fuscus, Pomoxis nigromaculatus, Pomatomus saltitrix, Lepomis macrochirus, Carpiodes spp.

Seining was conducted around Carroll Island, Maryland as part of an ecological research pro-gram initiated in August, 1969. Carroll Island is Edgewood Arsenal's major outdoor facility for field testing of riot control agents, simulants, and signaling and screening smokes. Fish were seined periodically from waters directly downwind from most test areas and from waters that probably received most of the rainwater drainage from test-ing sites. During the 8-month investigation, nearly 28 000 (in) ing sites. During the 8-month investigation, nearly 28,000 fish, representing 24 species, were collected. Bay anchovies, white perch, and silversides accounted for 90 percent of the total catch. White perch and silversides were present throughout the period, but anchovies were abundant only in September and October. Diversity indices computed for Carroll Island populations compare favorably with those reported from a southern estuary. Results of this study were similar to those of another seining investigation conducted on the Susquehanna Flats by Maryland fisheries biologists. Throughout the study, young-of-year white perch from one Carroll Island area were significantly smaller than white perch from three nearby locations. However, the growth rates were significantly smaller than white perch from three nearby locations. However, the growth rates of Hawthorne Cove perch were similar to those of fish in the other locations. This probably means that Hawthorne Cove fish were spawned later. No effects that could be attributed to the testing of chemical agents were found. (Long-Battelle)

THE WEST FALMOUTH OIL SPILL, I. BIOLO-

GY, Woods Hole Oceanographic Institution, Mass. H. L. Sanders, J. F. Grassle, and G. R. Hampson. Available from the National Technical Information Service as PB-209 428, \$3.00 in paper copy, \$0.95 in microfiche. Report No WHOI-72-20, April

1972. 48 p, 8 fig, 14 tab, 5 ref. Grant Nos 15080 FMW, 70-14, NSF GB-6027.

Descriptors: *Biology, *Oil spills, *Oil pollution, *Invertebrates, *Water pollution effects, *Biological communities, *Marine animals, Water pollution sources, Sampling, Mollusks, Commercial shellfish, Environmental effects, Annelids, Benthic fauna, Oil wastes, Water pollution, Waste water (Pollution), Crustaceans, Population, Cores, Trawling, Clams, Amphipoda, Gastropods, Ecology, Mites.

Identifiers: Sample preparation, Anthozoans, Nemerteans. Pycnogonids. Acarina. Echin-

Nemerteans, Pycnogonids, Acarina, Echin-odermus, Coelenterates, Wild Harbor River, van Veen grab, Capitella capitata, Gemma gemma, Bivalves, Polychaetes, Sipunculids, Biological samples, Arthropods.

The continuing biological effects of the West Fal-mouth oil spill on the invertebrate community were monitored from September, 1969 to November, 1971. Invertebrate specimens, obtained by trawl, grab, and core samples, were ex-amined mainly for the polychaete and bivalve conamined mainly for the polychaete and bivave con-stituents. The numbers and densities of individual polychaetes and bivalves found in the samples were tabulated and compared with previous findings. (See also W73-02024) (Long-Battelle) W73-02023

THE WEST FALMOUTH OIL SPILL. DATA AVAILABLE IN 1971. II. CHEMISTRY, Woods Hole Oceanographic Institution, Mass. M. Blumer, and J. Sass.

M. Blumer, and J. Sass. Available from the National Technical Informa-tion Service as AD-741 697, \$3.00 in paper copy, \$0.95 in microfiche. Report No WHOI-Ref-72-19, April 1972. 127 p. 22 fig. 3 tab, 23 ref, 1 append. Grant No NSF-GA-19472. N00014-66-C-0241.

Descriptors: "Aging (Physical), "Analytical techniques, "Oil spills, "Absorption, "Water pollution effects, "Shellfish, Sediments, Gas chromatography, Mass spectrometry, Aging (Biological), Weathering, Oil, Oily water, Biodegradation, Pollutant identification, Toxicity, Organic company pounds, Water analysis, *Massachusetts, Food webs, Benthos, Separation techniques, Environ-mental effects, Damages, Oysters, Clams, Odor,

Productivity.
Identifiers: *Oil characterization, *No. 2 fuel oil, Paraffins, Lipids, Chemical interference, Boiling point, Bioaccumulation, Persistence, Natural or-ganics, Biological samples, Column chromatoggantes, Bological Samples, Column translations, Taphy, Buzzards Bay, Aromatic hydrocarbons, Fate of pollutants, Fingerprinting, Alkanes, Phytane, Pristane, Wild Harbor River, Scallops, Quahogs, Fuel oil, Repopulation.

Studies which were initiated in 1969, have continued on Buzzards Bay, Massachusetts, the site affected by a spill of 650,000 to 700,000 liters of No. 2 fuel oil. The studies covered analysis of No. 2 tate oil. The studies covered animysis of hydrocarbons in water, sediments, and aquatic biota; persistence, fate, and weathering of the oil; and biological damage and recovery. The analyses were conducted using gas chromatography with an Apiezon L column. Aromatic hydrocarbon fractions of some sediments were isolated by colum chromatography, and combined aromatics were analyzed by mass spectroscopy. Since naturally occurring hydrocarbons exhibited many of the same characteristics as those spilled, they were differentiated by examining concentrations in sediments, boiling point distribution, hydrocarbon type distribution and by analysis of consecutive sections of a core sample. Several significant results were: (1) At most stations the oil was still detectable after 2 years. (2) Degradation occurs detectable after 2 years. (2) Degradation occurs slowly and seems to proceed by dissolution rather than by bacterial action. (3) Evaporation plays a minor role in weathering of oil. (4) Aging does not significantly after the ratios between adjacent members of homologous series. Study of the effects of the spill showed immediate kill in heavily oiled areas areas. Reco the less to t the food we ceptable for 02023) (Little W73-02024

TRACE-QU Monsanto C

ECOLOGIC STRUCTIO Marine Scie G. A. Rouns Available fr tion Service \$0.95 in mi Vol 2, No 1 Contract No

Descriptors

*Marine pla forms, Nuc Salinity, W Benthic far bass, Dissol bors, Tunne Lobsters, Cashrimp, Clastuarine etebrates, Mo Identifiers: Bay, Scolo Pontchartra strates, Ma Eelgrass, Z tecus. Pena Clymenella calcarea, A Ulva da Micropogor regalis, Roc

An evaluati ble ecologic construction ty of constr too closely significantly proliferation Perhaps th human sur power from ear and W73-02029

THE CONT OTHER 74 VARIOUS I R. R. Costa,

The Americ 559-564, Ap Descriptors Ecology, Da

Identifiers: tomus, B Nauplii, L lumbea, Po latus, Notes vitreum, Sar

The gut con of Leptodo oiled areas, with damage spreading to distant areas. Recovery extended gradually inward from the less to the more polluted areas. The oil entered the food web and made shellfish resources unacceptable for human consumption. (See also W73-02023) (Little-Battelle)

TRACE-QUANTITY ENGINEERING, Monsanto Co., Dayton, Ohio. For primary bibliographic entry see Field 05A. W73-02028

ECOLOGICAL EFFECTS OF OFFSHORE CON-

STRUCTION, Marine Science Inst., Bayou La Batre, Ala. G. A. Rounsefell.

U. A. Kounsetell. Available from the National Technical Informa-tion Service as AD-739 704, \$3.00 in paper copy, \$9.95 in microfiche. Journal of Marine Science, Vol 2, No 1, 1972. 208 p, 1 tab, 252 ref, 3 append. Contract No DACW72-71-C-0002.

Descriptors: *Ecology, *Environmental effects, *Marine plants, *Marine animals, Offshore platforms, Nuclear powerplants, Water properties, Salinity, Water temperature, Oxygen, Turbidity, Benthic fauna, Water pollution effects, Striped bass, Dissolved oxygen, Oil, Bridges, Buoys, Harbors, Tunnels, Marine algae, Animal populations, Lobsters, Crustaceans, Biomass, Shrimp, Pink shrimp, Clams, Water pollution, Chlorophyta, Estuarine environment, Islands, Grasses, Invertebrates, Molluksk, *Reviews. Identifiers: *Offshore construction, Delaware Bay, Scoloplos armiger, Alimitos Bay, Lake Pontchartrain, Pearl River, Lake Borgne, Substrates, Macroinvertebrates, New York Bight, Eelgrass, Zostera, Pinaeus duorarum, Pinaeus azcus, *Penaeus setiferus, Mercenaria mercenaria,

Edigrass, Zostera, Financia de Caracteria de Caracteria de Capitale, Clymenella torquata, Capitella capitata, Macoma calcarea, Astarte borealis, Enteromorpha minima, Ulva dactylifera, Panulirus interruptus, Ulva dactylifera, Panulirus interruptus, Micropogon undulatus, Croakers, Cynoscion regalis, Roccus saxatilis, Fundulus heteroclitus.

An evaluation of current knowledge of the probable ecological effects of various types of offshore construction reveals slight danger from the majori-ty of construction programs. The greatest dangers lie in the placement of artificial islands within or too closely adjacent to estuaries where they can significantly affect water exchange, and in the proliferation of water cooled nuclear power plants. Perhaps the most pressing need for ultimate human survival is the further development of power from natural forces to replace power from nuclear and fossil fuel sources. (Byrd-Battelle)

THE CONTRIBUTION OF LEPTODORA AND OTHER ZOOPLANKTON TO THE DIET OF VARIOUS FISH, Pittsburgh Univ., Pa. Pymatuning Lab. of Ecolophus

gy. R. R. Costa, and K. W. Cummins. The American Midland Naturalist, Vol 87, No 2, p 559-564, April 1972. 1 fig, 3 tab, 11 ref.

Descriptors: *Fish, *Food habits, *Food chains.

Descriptors: *Fish, *Food habits, *Food chains, *Fish food organisms, *Zooplankton, Population, Ecology, Daphnia, Rotifers, Waterfleas, Walleye, Copepods, Perches, Sunfishes, Bullheads, Crustaceans, *Pennsylvania.
Identifiers: *Leptodora kindtii, Cyclops, Diaptomus, Bosmina, Chydorus, Ceriodaphnia, Nauplii, Lake chub, Golden shiner, Hybopsis plumbea, Pomoxis annularis, Pomoxis nigromaculatus, Notemigonous chrysoleucas, Stizostedion vitreum, Sanctuary Lake (Penn.).

The gut contents of various fish were examined to determine what effect fish had upon the removal of Leptodora kindtii (Focke) and other zooplank-

ton species of Sanctuary Lake, Crawford Co., Pa. ton species of Sanctuary Lake, Crawton Co., 2... Fish caught at any time, but particularly those col-lected during regular zooplankton tows, were exlected during regular zooplankton tows, were ex-amined. They were identified, measured and their gut contents removed and stained in Congo Red. The entire contents were identified, and particular attention was given to the zooplankton com-ponent, especially the fluid-feeding predator, Lep-todora kindtii (Focke). A total count of each identifiable species was made and its percentage composition determined. The relative quantity of an item present in the gut was then compared to the relative quantity of that same item in the food complex. In this manner an index of selectivity (Ivlev's (1961) index) was determined. (Little-Bat-W73-02031

A METHOD OF MATHEMATICAL MODELING OF COMPLEX ECOLOGICAL SYSTEMS, For primary bibliographic entry see Field 05B. W73-02032

DESCRIPTION OF ALABAMA ESTUARINE AREAS-COOPERATIVE GULF OF MEXICO AREAS-COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY, Alabama Marine Resources Lab., Dauphin Island. For primary bibliographic entry see Field 02L. W73-02037

THERMAL EFFECTS OF POWER PLANTS ON

LAKES, Cornell Univ., Ithaca, N.Y. For primary bibliographic entry see Field 02H. W73-02068

CHLOROBIPHENYLS (PCBS) IN THE MIL-WAUKEE RIVER Wisconsin Univ., Madison, Water Chemistry Lab.

Gilman D. Veith, and G. Fred Lee. Water Research, Vol 5, p 1107-1115, 1971. 1 fig, 3 tab, 21 ref.

Descriptors: *Polychlorinated biphenyls, *Industrial wastes, *Chlorine, Water pollution sources, Fish, Sewage effluents, Toxicity, Municipal wastes, Aroclors.

Identifiers: *Milwaukee River (Wis), Enzyme in-

The chlorobiphenyls (PCBs) are similar to many chlorinated pesticides in that higher concentrations are found in organisms of the higher trophic levels. The chronic effects of PCBs in higher organisms and the levels of PCBs in water supp require evaluation. The presence of PCBs in fish of the Milwaukee River indicated that this tributary of Lake Michigan receives comparatively large quantities of this chemical. Results of a study of PCB sources in the Milwaukee River drainage basin are presented. Water analysis of the river indicated that isomers of chlorinated biphenyl similar to those used in industry were present from West Bend to Lake Michigan. That chlorobiphenyls were discharged through municipal and indus-trial wastes became evident by analyses of mu-nicipal sewage treatment plant effluents, industrial discharges, and the river water near combined sewer outfalls. PCB concentration in large ecosystems such as Lake Michigan suggest that they are partial results of water transport from metropolitan areas. Introduction of PCBs into the Milwaukee River by both large and small mu-nicipalities may reflect their widespread use in ucts of advanced technology and indicates a need for examination of PCB levels in common consumer products. (Jones-Wisconsin) W73-02084

EFFECT OF DIETRY DEFICIENCY OF TRACE ELEMENTS (CU, MO, MN) ON WATER AND ELECTROLYTE METABOLISM, Pediatricheskii Meditsinskii Institut, Leningrad (USSR) A. M. Kazakov.

ne and Sanitation, Vol 35, No 12, p 324-381. c. 1970. 2 tab, 12 ref.

Descriptors: Water treatment, *Public health, *Copper, *Manganese, *Molybdenum, *Deficient elements, *Trace elements.

Various aspects of the role of copper (Cu), man-ganese (Mn), and molybdenum (Mo) in water and electrolyte metabolism have not been adequately investigated. Therefore, the effects of rations deficient in one or more of the above elements were studied in long-term experiments on animals. The study of the effect of microelements' disbalance in the food ration on the state of water-salt metabolthe food ration on the state of water-salt metabotism in albino rats showed a rise of diuresis in case of deficiency in the diet of copper (by 30.7%) or that of a complex of copper-molybdenum-manganese (by 53.8%). The potassium level in animals' blood serum fell in the lack of copper and molybdenum and that of a complex of investigated elements (by 14-16%). Potassium excretion in the urine rose at deficiency in the food ration of urine rose at deficiency in the food ration of copper (by 45%) and molybdenum (by 29%); in the lack of manganese or that of all the microelements the potassium content in the urine decreased accordingly by 16 and 20%. (Bean-AWWARF)

HILLS CREEK RESERVOIR TURBIDITY STU-

DY, Oregon State Univ., Corvallis. Water Resources

Nesearch Inst. C. T. Youngberg, P. C. Klingeman, M. E. Harward, D. W. Lavson, and G. H. Simonson. Water Resources Research Institute Report No 14, December 1971. 327 p. 42 fig. 67 tab, 43 ref, 5 ap-pendices. DACW 57-71-C-0040.

Descriptors: "Reservoirs, "Turbidity, "Accelerated erosin, Oregon, Washouts, Inorganic compounds, Geologic formations, Road construction, Runoff, Rockslides, Erosion control, Sedimentation, Reservoir releases, Roads, Lumbering, Sediment load. Identifiers: *Hills Creek Reservoir (Ore.), Land-

Principal turbidity in Hills Creek Reservoir, Oregon, and its outflow is due to inorganic colloids in suspension. Smectites and amorphous materials are dominant; storm runoff carries them from slumps, landslides, and road failures to the reserslumps, landslides, and road failures to the reservoir during winter and early spring, with much remaining in suspension through the summer. In view of its limnological features, the reservoir might be classified oligotrophic: its basin is relatively deep and steep-walled, with little shoal or little littoral area to support rooted plants. The ther-mocline is situated high in the water column; the colimnion is large, cold, and well-oxygenated.
hough limited in quantity, the plankton species are diverse and aquatic vegetation is not abundant. Biological productivity is restricted by a paucity of dissolved organic and inorganic matter, maki the load of organic materials on the bottom and in suspension relatively low. Undetermined quantities of dissolved and particulate material and plankton are flushed periodically. The low quantities of organic matter may be related indirectly to turbidity since vegetation in sufficient quantities maintains clear and fertile waters metabolic and decompositional processes. Carbon dioxide production rate is slow with all available carbon dioxide rapidly utilized by photosynthetic organisms, thus restricting organic matter elaboration. (Jones-Wisconsin). W73-02092

Group 5C-Effects of Pollution

BIOMASS AND PRODUCTION OF MACROBENTHOS IN THE DEEPER PARTS OF KIEL BAY IN 1968, Kiel Univ. (West Germany). Institut fuer Meereskunde. For primary bibliographic entry see Field 02L. W73-02094

THE STRUCTURE AND FUNCTION OF FRESH-WATER MICROBIAL COMMUNITIES.
Virginia Polytechnic Inst. and State Univ.

Research Division Monograph 3, 1971. J. Cairns, Jr., editor, 301 p.

Descriptors: *Aquatic productivity, *Ecology, *Aquatic environment, *Biological communities, *Aquatic microorganisms, Cycling nutrients, Ecological distribution, Ecosystems, Aquatic habitats, Productivity, Aquatic bacteria, Aquatic algae, Carbon cycle, On-site tests, Aquatic animals, Aquatic populations, Bioassay, Eutrophication.

Identifiers: Mineral cycle, Characterization, Chlamydomonas reinhardtii, Tetrahymena vorax, Pseudomonas fluorescens, Autotrophic bacteria, Heterotrophic bacteria, Glucose, Acetates, Biotin, Niacin, Cobalamins, Euglena gracilis, Coloniza-tion, Caulobacter, Najas flexilis, Scirpus acutus, C-14, Dissolved organic matter, Macrophytes, Biological samples.

The 1969 symposium on 'The Structure and Function of Fresh-water Microbial Communities' sponsored by the American Microscopical Society was sored by the American Microscopical Society was directed toward an understanding of the relationships among living things in the aquatic environment. The topics included were: 'Adaptations for Photoregenerative Cycling', 'Carbon Flow in the Aquatic System'; 'Aquatic Laboratory Microsystems and Communities'; 'The Role of Laboratory Experimentation in Ecological Research'; 'A Continuous Gnotobiotic (Species Defined) Ecosystem'; 'Community Structure of Protozoans and Algae with Particular Emphasis on Recently Colonized Bodies of Water': 'Diatom Recently Colonized Bodies of Water'; 'Diatom Communities'; 'Microbial Relationships in Biolog-Communities'; 'Microbial Relationships in Biological Wastewater Treatment 'Heterotrophic Bacteria in Aquatic Ecosystems; Some Results of Studies with Organic Radioisotopes'; 'Seasonal Distribution of Cobalamins, Biotin and Niacin in Rainwater'; 'Lacustrine Fungal Communities'; 'Factors Affecting the Number of Species in Fresh-water Protozoan Communities'; 'The Interrelationship Between Freshwater Bacteria, Algae, and Actinomycetes in Southwestern Reservoris'; 'Chemo-Organotrophy in Epiphytic Bacteria with Reference to Macrophytic Release of Dissolved Organic Matter'; and 'Bacteriological Profiles and Some Chemical Characteristics of Two Permanently Frozen Antarctic Lakes'. (Long-Battelle)

AQUATIC INSECTS OF THE PINE-POPPLE

AQUATIC INSECTS OF THE PINE-FOPPLE RIVER, WISCONSIN, Wisconsin Dept. of Natural Resources, Madison. W. L. Hilsenhoff, J. L. Longridge, R. P. Narf, K. J. Tennessen, and C. P. Walton. Technical Bulletin No 54, 1972. 42 p, 1 fig, 10 tab,

Descriptors: *Aquatic insects, *Ecological distribution, *Systematics, Ecology, Life cycles, Life history studies, Distribution patterns, Mayflies, Diptera, Stoneflies, Dragonflies, Caddisflies, Sampling, *Wisconsin, Water beetles, Midges, Dobsonflies, Growth stages, Larvae, Immature growth stage, Freshwater, Streams, Fivers

Rivers.

Hoen River (Wis), Popple River, Woods Creek, Arthropods, Beetles, Bugs, Damielflies, Alderflies, Hellgrammites, Fishflies, Speies diversity, Macroinvertebrates, Nymphs,

Pteronarcys dorsata, Pteronarcys pictetii, Brachyptera (Strophopteryx) fasciata, Brachyp-tera (Oemopteryx) glacialis, Taeniopteryx burksi, Taeniopteryx nivalis, Taeniopteryx parusi, Nemoura (Prostoia) completa, Nemoura (Shipsa) Pteronarcys

Collections were made from May 1967 through August 1969 on the Pine River, Popple River and Woods Creek in Florence and Forest Counties, Wisconsin to document the aquatic insect fauna of these wild rivers. Distribution and abundance were recorded, and notes summarized on the ecology, life cycles and identification of: Plecoptera (34 species), Ephemeroptera (approximately 60 species), Megaloptera (39 species), Aquatic and semi-aquatic Hemiptera (47 species), aquatic Coleoptera (54 species), and aquatic Diptera (43 genera). (Long-Battelle) W73-02097

PESTICIDES AND FRESHWATER FAUNA, For primary bibliographic entry see Field 05B. W73-02098

STUDIES ON ALGAL GROWTH, DEVELOP-MENT, AND REPRODUCTION, California Univ., Irvine.

S. N. Murray.

Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No 72-14,661. Ph D Dissertation, 1971. 119 p.

Descriptors: *Algae, *Growth rates, *Systematics, *Life history studies, *Growth stages, Reproduction, Carbon dioxide, Cultures, Limiting factors, Rhodophyta, Aquatic algae, Microorganisms, Chlorophyta, Biology, Pollutant identification, Light intensity, Bioassay. Identifiers: Porphyropsis coccinea var. dawsonii, Callophyllis firma, Plenosporium dasyoides, Selenastrum capricornutum, PAAP batch test, Culture media.

The life history of the Bangiophycean red algae Prophyropsis coccinea var. dowsonii has been completed in laboratory culture. An undescribed filamentous phase, distinct in certain respects from the Conchocelis of Bangia and Porphyra, is reported. Callophyllis firma has been shown to have a Polysiphonia-type of life history in laboratory culture. This is the first laboratory confirmation of a typical Polysiphonia-type of life history in the Cryptonemiales. The rates of apical cell division for the marine red alga Pleonosporium dasyoides were determined at various light intensities. Rates of apical cell division were found to be dasyoides were determined at various light intensities. Rates of apical cell division were found to be correlated with the total amount of illumination received per 24 hour period. An analysis and discussion of the mechanisms of apical cell division in filaments of unlimited and limited growth of P. dasyoides is presented. The PAAP batch test has been evaluated in terms if its effectiveness. It has been evaluated in terms if its effedtiveness. It has been demonstrated that the prescribed method of medium preparation results in the removal of Fe and Mn from the medium during filter sterilization and consequently reduces algal yields. CO2 limits the growth of the green alga Selenastrum capricornutum, the prescribed test organism, and the concomitant increase in medium pH during the period of experimentation angears to have an effect on of experimentation appears to have an effect on nutrient availability in the test cultures. The effects of light intensity and the method of air addition are also discussed. (Long-Battelle) W73-02099

RELEASE OF DISSOLVED ORGANIC MATTER BY MARINE MACROPHYTES,

BY MARINE MACROPHYTES, Georgia Univ., Athens. M. Brylinsky. Available from Univ. Microfilms, Inc., Ann Ar-bor, Mich. 48106. Order No. 72-10,923. Ph D Dis-sertation, 1971. 125 p.

Descriptors: "Sea water, "Marine algae, "Carbohydrates, Marine plants, Marine microorganisms, Water analysis, Benthic flora, Organic matter, Dissolved solids, Benthos, Carbon, Productivity, Organic compounds, Carbohydrates, Cycling nutrients, Algae. Identifiers: Dissolved organic carbon, Macrophytes, Sargasso Sea, Sample preparation, Spermatophytes, Photoassimilation, Glyoxylic acid, Assimilation.

The amount of photoassimilated carbon relacased as dissolved organic carbon was investigated for six species of benthic marine macrophytes and one species of pelagic marine macrophyte. Release rates ranged between 0.223 and 1.805 mg C/gm hr. Percent release values ranged from 1.09 to 3.82 percent. Spermatophytes had slightly higher percent release values than algae. The results of qualitative analysis performed on the soluble carbohydrates released showed neutral carbohydrates to be liberated in the largest quantity followed by lesser amounts of acidic and basic carbohydrates. Glycolic acid was not observed to be released in significant quantities. Investigations bohydrates. Glycolic acid was not observed to be released in significant quantities. Investigations performed on the ability of release products to be utilized by heterotrophic organisms showed that 20-30 percent of the released carbon was assimilated within one hour. Preliminary calculations on the contribution of organic release products to the dissolved organic carbon pool of sea water show this to be relatively low in terms of absolute amounts of organic matter. A technique is presented for the concentration and measurement of dissolved carbohydrate materials in seawater. Analyses of seawater samples collected in various inshore plant communities and the Sargasso Sea indicate that the basic procedure is useful in obtaining detailed information on the dissolved car-bohydrate materials present in seawater. (Long-W73-02100

BIOLOGICAL EFF TRINITROTOLUENE (TNT), EFFECTS Indiana Univ., Bloomington.

Indiana Chiv., Boomington.
D. M. Gring.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 72-6782. Ph D Dissertation, 1971. 113 p.

Descriptors: *Tocicity, *E. coli, *Biodegradation, *Genetics, Pollutants, Waste treatment, Water pollution effects, Bioassay. Identifiers: *Trinitrotoluene, *Chlamydomonas reinhardi, Chlamydomonas, Mutagens, Mutation.

Short term toxic effects, long term genetic effects, Snort term toxic effects, long term genetic effects, and the biodegradability of trinitrotoluene (TNT) were investigated using Chlamydomonas reinhardi and Escherichia coli. It was found that low concentrations (3.0 microgram/ml) of alpha TNT are quite toxic to C. reinhardi whereas E. coli was capable of removing enough TNT cc (a colored complex formed from TNT) from growth medium to render it less toxic to C. reinhardi. The frequency of spontaneous mutation in both E. coli and C. reinhardi was suppressed ten-fold by alpha TNT reinhardi was suppressed ten-fold by alpha TNT. reinhardi was suppressed ten-fold by alpha TNT. reinhardi was suppressed ten-fold by alpha TNT. In addition, the rate of spontaneous mutation was suppressed in E. coli. It was also determined that E. coli was capable of reducing at least one of the nitro groups of TNT to its respective amine form, indicating that modern sewage treatment methods may be useful for treating TNT in waste waters. (Snyder-Battelle) W73-02101

EFFECTS OF ACUTE GAMMA RADIATION AND TEMPERATURE ON GROWTH AND SURVIVAL OF JUVENILE RAINBOW TROUT (SALMO GAIRNDERI), Washington State Univ., Pullman. E. H., Edmundson, Jr. Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No 72-7644. Ph D Dissertation, 1971. 57 p.

Descriptors: *fects, *Therm tion, Bioassa temperature, stage, Aquaria Identifiers: * preparation.

Effects of acu on survival at (Salmo gairdn aquaria utiliz aquaria utiliz gerlings acclir ous doses of gen (R) and pl or 20 C. They temperatures body weight is Survivors wer in the basic ex significant (P emperature, interaction or cluded that th radiation less regimes studie d survival o telle) W73-02102

AND IONIC I Case Western W. C. Mackay Available fro bor, Mich. 48 tion, 1971. 180

Descriptors: *Permeability Water polluti physiology, *'
Identifiers: *(tion, Ionic reg

OF

Goldfish wer permeability Water perme flow and by higher temper in the effective exchange rati permeability. urine flow she absorption of perature over tures (14-24 (But at temper tolerance (6.5 were inhibited and Cl showe imes greater acclimated fi position in between 10 a osmolality, N in fish acclim by fish which 30 C in demit temperature chloride uptal depleted of s clearly affect Uptake in the climation. between upta zero indicati (Snyder-Batte W73-02103

THE LITTO SWEDISH), Goteborg Ur Descriptors: *Rainbow trout, *Water pollution effects, *Thermal pollution, *Gamma rays, Radiation, Bioassay, Water pollution sources, Water temperature, Fry, Juvenile fish, Juvenile growth stage, Aquaria, Equipment, Growth rates, Identifiers: *Survival, Salmo gairdneri, Sample preparation.

Effects of acute gamma radiation and temperature on survival and growth of juvenile rainbow trout (Salmo gairdneri) were studied in continuous flow aquaria utilizing a split-plot design. Fish fingerings acclimated to 10 C were exposed to various doses of gamma radiation up to 1,000 Roentgen (R) and placed into filtered tap water at 10, 15, or 20 C. They were raised in one of these water temperatures for 28 days and fed 4 percent of their temperatures for 28 days and fed 4 percent of their body weight in commercial fish food once per day. Survivors were weighed weekly and counted daily in the basic experiment. There were no statistically significant (P less than or equal to .05) effects of temperature, radiation, or temperature-radiation interaction on survival and growth. It was con-cluded that the combined action of acute gamma radiation less than 1,000 R and temperature regimes studied does not noticeably affect growth and survival of juvenile raishow trust (I con-Ratand survival of juvenile rainbow trout. (Long-Battelle) W73-02102

EFFECTS OF TEMPERATURE ON OSMOTIC AND IONIC REGULATION IN GOLDFISH. Case Western Reserve Univ., Cleveland, Ohio. W. C. Mackay.

Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No 72-73. Ph D Dissertation, 1971. 180 p.

Descriptors: *Absorption, *Sodium, *Chlorine, *Permeability, *Water temperature, Ions, Salts, Water pollution effects, Urine, Bioassay, Fish physiology, "Thermal pollution. Identifiers: *Goldfish, Excretion, Osmotic regulative Ionic aculation."

tion, Ionic regulation.

Goldfish were used to determine the effects of acute and chronic changes in temperature on water acute and chronic changes in temperature on water permeability and on salt uptake and excretion. Water permeability as measured both by urine flow and by tritiated water efflux was greater at higher temperatures. This may be due to changes in the effective surface area of the gill used for gas exchange rather than a real change in epithelial permeability. Water permeability as measured by urine flow showed temperature acclimation. Renal absorption of Na and Cl was independent of temserature acceptance of temperature acclimation. assorption of value of the perature over an intermediate range of temperatures (14-24 C) in goldfish acclimated to 22-24 C. But at temperatures near the lower limit of thermal tolerance (6.5 C) renal Na and Cl and reabsorption were inhibited. The rate of renal excretion of Na and CI showed temperature acclimation in that NA AND CI excretion measured at 20 C was 7 to 8 times greater in 10 C acclimated fish than in 30 C acclimated fish. Plasma osmolality and ion composition in fish acclimated to temperatures between 10 and 30 C was constant but plasma osmolality, Na, and Cl concentrations were lower in fish acclimated to 6.5 C. The net uptake of Na by fish which had been acclimated to 10, 20, and 30 C in demineralized water increased with acute temperature increases. However, sodium and chloride uptake in normal fish which had not been chloride uptake in normal fish which had not been depleted of salts was very variable and was not clearly affected by acute temperature changes. Uptake in these fish did not show temperature acclimation. However, the average difference between uptake and excretion in these fish was zero indicating that they were in salt balance. (Snyder-Battelle) W73-02103

THE LITTORAL VEGETATION AT LAKE MJORN IN WESTERN VASTERGOTLAND, (IN SWEDISH), Goteborg Univ. (Sweden). Inst. of Systematic

Botany.

For primary bibliographic entry see Field 02H. W73-02104

DDT RESIDUES IN COASTAL MARINE PHYTOPLANKTON AND THEIR TRANSFER IN PELAGIC FOOD CHAINS, Stanford Univ., Calif.

I. L. Cox.

Available from Univ. Microfilms, Inc. Ann Arbor, Mich. 48106. Order No 72-5903. Ph D Dissertation,

Descriptors: *DDT, *Marine fish, *Phytoplankton, *Shrimp, *Bioassay, *Absorption, Pesticide residues, Water pollution effects, *California, Sea water, Water analysis, Marine algae, Chemical analysis, Marine algae, Chemical analysis, Adsorption, Separation techniques, Food chains, Cultures, Fish diet, Gas chromatog-raphy, Particulate matter, Detritus, Organic com-pounds, Path of pollutants.

Identifiers: *Electron capture gas chromatography *Biological magnification, Gas liquid chromatography, Electron capture detector, Preconcentra-tion, Biological samples, Liquid-liquid extraction, Triphoturus mexicanus, Euphausia pacifica, En-

graulis mordax.

Studies were conducted on the entry and transfer of DDT residues in pelagic marine food chains. of DDT residues in pelagic marine food chains. Analyses were done on phytoplankton and detrital material collected by a net or by continuous-flow centrifugation. Seawater samples were extracted by continuous flow, iquid-liquid extraction. Gasliquid chromatography with electron capture detection (GLC-EC) was employed for the analyses. GLC-EC analyses were also performed on samples of surface and midwater fishes and zooplankton. Experimental work with C-14-DDT was done with pure cultures of phytoplankton and with a common euphausiid shrimp. Phytoplankton samles collected in Monterey Bay. California, from ples collected in Monterey Bay, California, from 1955 to 1969 contained compounds identified as 1955 to 1969 contained compounds identified as p.p.*DDT, p.p.*DDD, and p.p.*DDD. Total concentrations of these compounds were approximately three times greater in the later samples. Uptake studies with pure cultures of marine phytoplankton showed that the algal cells, when exposed to low parts per trillion nominal concentrations of C-14-DDT in the medium, could concentrate the labelled DDT by factors ranging from centrate the labelled IDD1 by factors ranging from 30,000 - 80,000. DDT residue concentrations in whole seawater ranged from 2.3 pg/ml off Oregon and Washington, to 5.6 pg/ml off southern California. DDT residue concentrations in particulate material ranged from 1.2 to 5.7 micrograms/g C (with one exception). Experimental results are described which implicate adsorption as the up-take mechanism for algal cells; these experiments also support the idea that small particles carry most of the DDT residues in whole seawater. Euphausia pacifica Hensen can acquire sufficient DDT residues from its food to account for amounts found in its tissues. Direct uptake of Camounts found in its tissues. Direct uptake of C-14-DDT from water is partially reversible by returning animals to unlabelled flowing seawater. GLC-EC analyses of Triphoturus mexicanus, showed that older fish had higher DDT residue concentrations, suggesting that fish accumulate DDT residues from the environment during their life span. The DDT residue content of different size classes of Engraulis mordax Girard ranges from 0.2 to 2.8 sons, wat weight These findings. from 0.2 to 2.8 ppm, wet weight. These findings are discussed in the context of a simple model of DDT residue assimilation food and DDT residue loss via transport in the reproductive materials. (Snyder-Battelle) W73-02105

HEAVY METAL ION INTERACTION AND TRANSPORT WITH SYNTHETIC COMPLEX-ING AGENTS AND DETERGENT PHOSPHATE SUBSTITUTES IN AQUATIC SYSTEMS, Missouri Water Resources Research Center, Roi-

For primary bibliographic entry see Field 05A. W73-02112

SIGNIFICANCE OF THE FECAL STREPTOCOCCI, COLIFORM BACTERIA AND COLIPHAGE IN RELATIONSHIP TO ENTERIC VIRUS POLLUTION IN SEWAGE AND RIVERS, Rhode Island Univ., Kingston. Dept. of Animal Pathology. ary bibliographic entry see Field 05B.

WATER QUALITY OF HYRUM LAKE AND ITS RELATIONSHIP TO ALGAL BLOOMS, Utah Water Research Lab., Logan. R. I. Lynn, and R. B. Murray. Available from the National Technical Informa-

tion Service as PB-213 321, \$3.00 in paper copy, \$0.95 in microfiche. Completion Report (1972), 54 p, 15 fig. 25 tab, 51 ref. append. OWRR A-009-UTAH (1).

Descriptors: *Eutrophication, *Feed lots, *Ru-noff, *Bioindicators, Nitrogen, Phosphorous, Car-bon, Anaerobic conditions, Coliforms, Utah, Water pollution effects, Control, Nutrients, Nitrogen fixation. Identifiers: *Aphanizomenon, Phosphorous up-take, Hyrum Lake (Utah).

The relationship between the occurrence of an algal bloom in a northern Utah lake and the corresponding availability of nutrients indicate phosphorous to be the limiting macronutrient. Feedlots surrounding the lake appear to contribute significant quantities of nutrient to the lake. Algal significant quanties of nutrient to the ack. Alga-growth is initiated yearly with the release of phosphorous from the lake sediments. Coliform bacterial counts are shown to be qualitatively ac-curate diagnosticly regarding fecal pollution but relatively useless for quantitative measurement of nutrients thus contributed. Aeration of the hypolimnion is suggested as a possibility for control of the algal bloom phenomenon. W73-02121

NUTRIENT REMOVAL BY WATER-HYACINTH, Auburn Univ., Ala. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05G.
W73-02122

ECOSYSTEM STRUCTURE AND FUNCTION, PROCEEDINGS OF THE THIRTY-FIRST ANNUAL BIOLOGY COLLOQUIUM.

Oregon State University Press, Corvallis, J. A. Wiens, editor. 1971. 176 p.

Descriptors: *Environmental effects, *Ecological distribution, *Ecosystems, *Balance of Nature,
*Nutrients, Adaptation, Biomass, Ecology, Com-munities, Ecotypes, Evolution, Phosphates, Environment, Carbon dioxide, Primary productivity, Erosion, Herbivores, Aluminum, Ions, Nitrogren, Arthropods, Atlantic Ocean, Fish, Populations, Nitrification, Zooplankton, Atmosphere, Mitrates, Niches, Habitats, Bacteria, Batymetry, Microorganisms, Birds, Calcium, Carbon, Carbon dioxide, Radioisotopes, Diptera, Model studies,

Chlorides. Ulothrix, Polyporus, Adenosine triphosphate, Autotrophs, C-14, Sargasso Sea, Biocoensis, Biogeochemical, Biogeocenosis, Coadaptation, Decomposer, Deforestation, Diversity, Eel grass, Exococtidae, Gulf of Guinea, Heterotrophs, Hymenoptera, Mycorrhizae, Myc-tophidae, Nuclear power, Phagotrophs, Produ-cers, Supraorganism, Thallassia, Typha, Ul-

The proceedings of the thirty-first annual biology colloquium included papers on the following top-ies: "Ecosystem Theory in Relation to Man", 'Nutrient Cycling in Ecosystems', 'Energy Flux in Ecosystems', 'Patterns of Production in Marine Ecosystems', 'Measurement of Structure in

Group 5C-Effects of Pollution

Animal Communities', and 'Evolution of Natural Communities'. (LongiBattelle) W73-02124

THERMAL, TURBIDITY, AND PH CONDITIONS OF THE UPPER WHITE RIVER: SIOUX AND DAWES COUNTIES, NEBRASKA, Arizona Univ., Tucson. Dept. of Anthropology.

Transactions of the Nebraska Academy of Sciences, Vol 1, p 35-42, March 1972. 4 fig, 2 ref.

Descriptors: "Water temperature, "Turbidity, "Water chemistry, "Trout, "Fish behavior, Mor-tality, Spawning, "Nebraska, Cold-water fish, Sport fish, Identifiers: "White River (Neb).

The White River is an easterly flowing body of water originating in the buttes a few miles west of the town of Andrews, Nebraska. Trout were not found in the river north of Chadron, apparently due to adverse conditions beyond their tolerance levels. Trout are stocked in the river above Crawlevels. Trout are stocked in the river above Craw-ford, and no other obvious barriers prohibit their dispersal downstream. Streams with alkaline water are the best suited for trout habitant, because mutrients are more abundant. In the White River the most alkaline water supports the majority of the trout. In the lower stretches of the study area near Whitney, turbid water and a lack of aquatic usceptation are the predominant limit on trout. Invegetation are the predominant limit on trout. Inverse correlations were found between pH and turbidity where the sediment is primarily organic.
Definite influences of cultivated lands on water
turbidity are shown in the lower portion of the study area. Temperatures vary considerably within short distances in all reaches of the river. (Knapp-USGS) W73-02151

WHAT'S IT ALL ABOUT, ALGAE, Buck, Seifeit and Jost, Morrisville, Pa. For primary bibliographic entry see Field 05G. W73-02187

ACCUMULATIONS OF CERTAIN PESTICIDES IN ADIPOSE TISSUES AND PERFORMANCE
OF ANGUS, HEREFORD AND HOLSTEIN
STEERS FED APPLE PROCESSING WASTES, Pennsylvania State Univ., University Park. L. L. Wilson, D. A. Kurtz, J. H. Ziegler, M. C. Rugh, and J. L. Watkins. Journal of Animal Science, Vol 31, p 112-117, 1970. 4 tab, 17 ref.

Descriptors: *Waste disposal, Pesticides, *DDT, *DDE, *Pesticide residues, *Cattle, Water pollution effects.
Identifiers: *TDEA.

There is a differential amount of pesticide deposition in cattle with different genetic abilities, because of their horticultural waste feeds containing various pesticides like DDT, DDE, TDE, etc.
Three trials had been conducted to determine (A)
the concentration of pesticide residues in fat from
Angus, Hereford and Holstein steers fed dried Angus, Hereford and Holstein steers fed dried apple processing waste and (B) the ration replacement value of apple waste for standard cattle feeds. Statistical analyses included analyses of variance, and where applicable, Duncan's Multiple Range Test. Results are presented in four tables and discussed at length. Fat deposition measures were significantly less for Holsteins than for Herefords. However, concentrations of pesticide residues of fat from Holsteins vs. Herfords were similar. Although the fat of waste fed cattle considerations. residues of fat from Holsteins vs. Herfords were similar. Although the fat of waste fed cattle con-tained significantly more total DDT residue than did fat of cattle not fed waste, these results in-dicate that low to moderate levels of apple waste may be used in cattle finishing rations. (Morparia-Texas) W73-02204

KINETICS OF ALGAL BIOMASS PRODUC-TION SYSTEMS WITH RESPECT TO INTENSI-TY AND NITROGEN CONCENTRATION, California Univ., Berkeley. G. Shelef.

O. onesef. Available from University Microfilms, Inc., Ann Arbor, Michigan 48106, Ph D. Dissertation, 1968, 265 p.

Descriptors: "Nitrogen, "Irradiation, "Algae, Waste treatment, Euthrophication, Model studies, Biomass, "Light intensity. Identifiers: Kinetic models, Chlorella pyrenoidosa, "Algae biomass.

noidosa, "Algae biomass.

Three kinetic models to describe the relationship between the irradiance and algal growth and production were developed and evaluated. These three were based upon: (a) energy balance and/or a 'zero order-first order' kinetic relationship; (b) the rectangular hyperbola function; and, (c) the exponential function. The models incorporated the spectral distribution of the light source as it affected the essential parameters - light conversion efficiency and light transmission in an optically dense algal suspension. Of the three, the model based on the exponential relationship proved most compatible with the experimental results under the conditions of a chemostatic Algatron reaction. The Modified Exponential Function best described the relationship between nitrate-nitrogen concentration and algal specific growth rate under conditions of light saturation in a continuous culture of Chlorella pyrenoidosa. The use of the MEF was applicable in optically dense algal cultures in describing the relationship between nitrate-nitrogen concentration and the average net algal specific growth rate or net algal production. (Anderson-Texas)

TEMPERATURE TOLERANCE AND THYROID ACTIVITY OF THE WHITE PERCH ROCCUS (±MORONE) AMERICANUS, Maryland Univ., Solomons. Natural Resources

A. J. McErlean, and H. J. Brinkley. Journal of Fish Biology, Vol 3, p 97-114, 1971. 2 fig, 8 tab, 34 ref. OWRR A-002-MD (14) USPHS 1-F3-WP,14601.

Descriptors: *Heat resistance, *White perch, *Fish physiology, *Radiochemical analysis, Water temperature, Thermal stress, Seasonal, Bioassay, Radioisotopes.

Identifiers: *Thyroid activity, Thiourea, Thyrox-

The seasonality of temperature tolerance using thiourea-treated, normal, and thyroxine-treated white perch was determined after laboratory acclimation, and LD50 values were calculated by normit analysis. Treatment effects, reflected by slight shifts in LD50 values, were evident. However, these did not fit a consistent pattern of thyroid involvement in temperature tolerance. When specimens of known thyroid functional state were used in tolerance tests, results similar to the specimens of known thyroid functional state were used in tolerance tests, results similar to the seasonal tolerance tests were obtained. Although the white perch has a functioning thyroid capable of forming radiohormone, no tolerance shifts were noted. Data obtained in tolerance testing were statistically adjusted to eliminate variation due to differences in acclimation temperatures (season) and to test for treatment (thyroid functional state) effects. Treatment difference was not significant. and to test for reatment (upvold functional state) effects. Treatment difference was not significant, but the effect due to season was significant (P less than 0.01). Thyroid functional state was unrelated to temperature tolerance. (Svensson-Washington) W73-02273

PESTICIDE-INDUCED STRESS PROFILES, National Marine Water Quality Lab., West King-ston, R. I. Preprint, FAO (Food and Agriculture Organiza-tion, United Nations) Technical Conference on Marine Pollution and its Effects on Living Resources and Fishing, Rome, 9-18 Dec 1970. 9 p, 4 fig, 2 tab, 25 ref. FIR: MP/70/E-12.

Descriptors: *Pesticide toxicity, *Aquatic life, *Profiles, *Water pollution effects, Pesticides, Aquatic environment, Insecticides, Clams, Organophosphorous pesticides, Endrin, Bioassay, Stress, Chlorinated hydrocarbon pesticides. Identifiers: *Sublethal effects, Quahog clams, Puffers, Northern puffers, Methoxychlor, Methyl parathion.

Synthetic pesticides, especially organochlorine and organophorous insecticides, have become increasingly important additions to chemical wastes polluting aquatic communities. Many of the insecticides are considered hazardous because of their ability to kill or immobilize aquatic organisms at extremely low concentrations, i.e. at levels sub-stantially below 10 micrograms/liter. Scientists concerned with the health of persons who routineby work with dangerous materials have developed a profile technique based on the acceptable hypothesis that metabolic disturbances have a far nyponesis that metanonic assurroances nave a rai greater probability of detection if a number of parameters are simultaneously determined and plotted. Radical profiles are given for the effects of endrin, methyl parathion andmethoxychlor on selected blood and tissue constituents of northern puffers. Profiles are also given for the effects of four different concentrations of methoxychlor on quahog clams. (Svensson-Washington) W73-02274

THE MOLLUSCICIDE ACTION OF THIOL REAGENTS (DIE MOLLUSCIZIDE WIRKUNG VON THIOL-REAGENTIEN),

1. Zsomai. Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten un Hygiene, Part I, Vol 213, p 270-283, 1970. 1 tab, 8 ref. (English ab-stract).

Descriptors: *Pesticide toxicity, *Chemcontrol, *Snails, *Mollusks, *Toxicity, *Sulfur compounds, Pesticides, Gastropods, Arsenicals (pesticides), Mercury, Public health, Lethal limit, Bioassay, Organic compounds, Hydrocarbons, Rhodamine, Chemicals, Pest control, Water pollution sources, Water pollution effects.

Identifiers: *Molluscicides, *Pianorbis spp., *Thiol groups, Nitroso compounds, Benzol compounds, Alkanes, Aliphatics, Cycloaliphatics, Pentachlor-phenol, Hexachlorophen, Yomesan, English abstract.

The molluscicidal actions of a number of comne monuscicidal actions of a number of com-pounds which react with thiol groups and, there-fore, belong to the sulfhydryl-enzyme-inhibitors, were investigated. The majority of the tested com-pounds have proved effective. Some of them ex-hibited the same degree of efficacy as the best of the so far known molluscicide substances, which are pentachlor-phenol, hexachlorophen, and yomesan. (LeGore-Washington) W73-02275

REFECT OF LIME NEUTRALIZED IRON HYDROXIDE SUSPENSIONS ON JUVENILE BROOK TROUT (SALVELINUS FONTINALIS, MITCHILL), Pittsburgh Univ., Pa. Graduate School of Public Health

Nearline Heading Head M. Synak. Water Research, Vol 6, p 935-950, 1972. 5 fig, 7 tab, 29 ref. EPA 18050 DJF.

Descriptors: "Water pollution effects, "Toxicity, *Iron compounds, "Brook trout, Industrial wastes, Metals, Inorganic compounds, Bioassay, Lethal limit, Fish diseases, Freshwater fish, Fish, Trout, Inhibition, Growth rates, Turbidity.

Identifiers: * Acute toxicit

After neutral suspended iro of iron were a brook trout (3 smaller size suspended fer argest trout average weight in high iron coin 6 mg/l. The represented represented gradually inc curring in lo mean weights trol were almo computed for exposed to 12 brook trout in a leveling tre Washington) W73-02277

> ELEMENTA ESTUARINE HETEROCL National Mar ston, R. I. R. Eisler, and Journal of Ecology, Vol

Descriptors:
*Fundulus syments, Fis
Copper, Iro
ganese, Sod
minum, Gol
Cobalt, Chr
Lead, Rubic
fects, W Elasmobranc Identifiers: * tion, Acclima

Elements tha ashed Funda ashed Fundi atomic absor K, Mg, Mn, Ag, Al, Au, Rb, and Tl. age of the fis of collection selected elemage: in the a body length, and less K, ferences in t fects of varie temperature, water formul replacement the element teleosts and discussed. (L W73-02278

METABOLE DIATOMS, Manitoba Ur S. Miyazaki, Bulletin of Toxicology,

Descriptors: *Persistence physiology, toxicity, Pat Identifiers: *Ferric hydroxide, *Iron hydroxide, Acute toxicity, Chronic toxicity, Growth inhibi-

After neutralization, oxygenation and detention, suspended iron was released automatically at regular intervals into test aquaria. Four concentrations of iron were maintained, each containing 10 young brook trout (3 months old). A definite trend toward smaller size with increasing concentration of suspended ferric hydroxide was revealed, with the largest trout in 6 mg Fe/l and in the control. The average weight of the brook trout was much lower in high iron concentrations than in the control and in 6 mg/l. The final mean weight of fish in 50 mg/l represented only 16% of the control, with gradually increasing percentage proportions ocrepresented only 16% of the control, with gradually increasing percentage proportions occurring in lower iron concentrations. The final mean weights of the fish in 6 mg/l and in the control were almost identical. The average growth rate computed for five different size groups of fish revealed a sudden decline in growth of brook trout exposed to 12, 25, and 50 mg/l. The growth rate of brook trout in 6 mg/l and in the control shows only a leveling trend as of the 35th week. (LeGore-Washington) Washington) W73-02277

ELEMENTAL COMPOSITION OF THE ESTUARINE TELEOST HETEROCLITUS (L.), National Marine Water Quality Lab., West King-

R. Eisler, and G. LaRoche.

Journal of Experimental Marine Biology and Ecology, Vol 9, p 29-42, 1972. 1 fig, 6 tab, 21 ref.

Descriptors: *Elements (Chemical), *Killifishes, *Fundulus species, *Baseline studies, Trace ele-*Fundulus species, *Baseline studies, Trace ele-ments, Fish, Spectrophotometry, Calcium, Copper, Iron, Potassium, Magnesium, Man-ganese, Sodium, Strontium, Zinc, Silver, Alu-minum, Gold, Barium, Beryllium, Cadmium, Obalt, Chromium, Cesium, Lithium, Nickel, Lead, Rubidium, Thallium, Environmental ef-fects, Water temperature, Salinity, Flasmohyacch. Elasmobranchs.

Identifiers: *Elemental composition, Acclimatization. Acclimation.

Elements that were consistently present in whole ashed Fundulus heteroclitus as determined by atomic absorption spectroscopy were Ca, Cu, Fe, K, Mg, Mn, Na, Sr, and Za; not measurable were Ag, Al, Au, Ba, Be, Cd, Co, Cr, Cs, Li, Ni, Pb, Rb, and Tl. This pattern was not affected by the Rb, and II. Inis pattern was not affected by the age of the fish, its sexual condition, or the season of collection. Changes in whole body content of selected elements were observed with increasing age: in the range between 46 and 118 mm total body length, large fish contained more Ca and Sr and less K, Mg, Na, and Zn than small fish. Differences in the elemental content of heads, carreage and viscours were also determined. The effects of the second services and viscours were also determined. The effects of the second services and viscours were also determined. The effects of the second services and viscours were also determined. The effects of the services are also determined. The effects of the services are also determined. casses and viscera were also determined. The effects of various combinations of changes in water temperature, salinity, acclimation periods, sea-water formulations, feeding frequencies and water replacement were determined. Selected data on the elemental composition of other species of teleosts and elemental composition of other species of discussed. (LeGore-Washington)

METABOLISM OF DDT BY FRESH WATER

DIATOMS,
Manitoba Univ., Winnipeg. Dept. of Entomology.
S. Miyazaki, and A. J. Thorsteinson.
Bulletin of Environmental Contamination and
Toxicology, Vol 8, No 2, p 81-83, 1972. 1 tab, 13

Descriptors: *DDT, *DDE, *Pesticide kinetics, *Persistence, *Water pollution effects, *Plant physiology, *Diatoms, Pesticides, DDD, Pesticide toxicity, Path of pollutants, Pesticide residues,

Chlorinated hydrocarbon pesticides, Pesticide drift, Metabolism, Algae, Aquatic algae, Chrysophyta, Plankton, Phytoplankton.

Reductive dechlorination of DDT to TDE (DDD) under anaerobic conditions has been demonstrated in baker's yeast, a fungus, several actinomycetes, and bacteria. DDE, the dehydrochlorination product of DDT, also occurs in several bacteria and in a marine diatom. A possible role of diatoms and in a marine unation. A possible role of enations in detoxifying DDT in aquatic environments has been suggested. Radiolabelling and thin-layer chromatography were used in this study of DDT metabolism by a Nitzschia sp. and an unidentified metabousan by a Nilzschia sp. and an unidentified diatom species. Results suggest that some species of freshwater diatoms may be significant in the degradation of DDT to the non-insecticidal metabolite, DDE, in nature. (LeGore-Washington) W73-02280

TOXICOLOGICAL STUDIES ON EMULSIONS FOR THE COMBATTING OF OIL POLLUTION (TOXIKOLOGISCHE UNTERSUCHUNG VON OELVERSCHMUTZUNGEN),
Bundesforschungsanstalt fuer Fischerei, Hamburg

(West Germany). K. J. Bock, and H. Mann.

Archive fur Fischerei Wissenschaft, Vol 23, No 1, p 64-67, June 1972. 3 tab, 4 ref.

Descriptors: *Detergents, *Emulsifiers, *Water pollution effects, *Water pollution control, *Oil pollution, Surfactants, Formulation, Chemicals,

pollution, Surfactants, Formulation, Chemicals, Annelids, Benthic fauna, Invertebrates, Benthos, Lethal limit, Bioassay, Pollutants, Oily water, Tubificids, Worms, Trout, Eels, Crustaceans, Copepods, Crabs, Shrimp, Brine shrimp, Identifiers: Guppies, Crangon spp., Gammarus spp., Carcinus spp., Shellsol, Marlican, Alkylphenoloxethylate, Fatty acid-polyglycol ester, Nonylphenoloxethylate-phosphoric acid ester, DEA-Salz, Petroleum acid, Oxethyl ethylenediamine-petroleum acid ester.

Fourteen different samples of special oil dispersing products were examined with regard to the toxicity they cause in organisms of freshwater, the toxicity they cause in organisms of freshwater, brackish water and seawater (tubifex worms, guppies, trout, glass eels, prawns, brine shrimp, copepods, and crabs). Studies indicated that a great number of the compounds are to be grouped into class III of the classification according to Hellmann and Knoepp, which means that up to the bighest exprised concentration of 2000 and the control of Helimann and Knoepp, which means that up to the highest examined concentration of 200 mg/l no toxicity exists. A specially low degree of toxicity was found in a mixture of 40% Marlican (registered trademark) and 60% fatty acid polygycol ester. These results have shown that products of the fatty acid-polyglycolic ester group are of practical importance. (LeGore-Washington)
W73-02281

THE IMPACT OF REDUCED LIGHT PENETRA-TION ON A EUTROPHIC FARM POND, Nebraska Univ., Lincoln. Dept. of Zoology.

E. G. Buglewicz.
M.S. Thesis, August 1972. 99 p, 20 fig, 11 tab, 24 ref. OWRR A-014-NEB (7) 14-31-0001-3527.

Descriptors: "Eutrophication, Aquatic ecosystems, Water quality, "Algae, "Light penetration, "Macrophytes, "Aquatic weed control, "Light intensity, "Nebraska, "Cyanophyta, Algal control, "Pondweeds, Ponds, "Thermal stratification, Diatoms, "Chara. Identifiers: "Analine dye.

An experimental approach to the control of eutrophication problems using aniline dyes was at-tempted on an enriched farm pond in eastern Nebraska. Primary productivity was shown to decrease not only in the dyed boxes, but also in pond samples suspended in the boxes. Potamogeton sp. was eliminated from blue and

brown-dyed boxes, while Chara sp. was only eliminated from the blue-dyed boxes. A strong temperature stratification occurred in all dyed boxes due to absorption of infrared energy in the first few cm of the water columns. Algal populations and pulses within the boxes differed from box to box and did not reflect the same changes observed in the pond, but did resemble fall and spring diatom pulses. Blue-green blooms present in experimental boxes 2, 4, 5 and 6 before dye addition were replaced by populations of diatoms with some green and a few blue-green algae. Box 3, which was turbid before dye addition, never experimented a blue-green algal pulse, but maintained a high population of diatoms. Lack of mixing of the water columns may have had a profound effect the water columns may have had a profound effect on the results of the experiment by causing temon the results of the experiment by causing temperature stratification, excessive primary productivity, prolonged anaerobic conditions below the surface of the water, and increased nutrient release from the bottom muds.

W73-02349

TECHNICAL EVALUATION OF PHOSPHATE--FREE HOME LAUNDRY DETERGENTS, IIT Research Inst., Chicago, Ill.

IIT Research Inst., Chicago, III.
H. G. Reilich.
Copy available from GPO Sup Doc EP 1.16:16080
DVF 02/72, \$1.25; microfiche from NTIS as PB213 410, \$0.95. Environmental Protection Agency,
Water Pollution Control Research Series, February 1972. 120 p, \$5 fig. 13 tab, 5 ref, 2 append. EPA
Program 16080 DVF 02/72.

Descriptors: *Evaluation, *Laundering, *Detergents, *Formulation, Phosphates, Hardness (Water), Surfactants, Toxicity, Biodegradation, Hydrogen ion concentration, Economics, Sodium compounds, Electrolites, Water pollution control, Eutrophication, Testing, Chelation.

Identifiers: *Phosphate-free detergents, Dish-

washing detergents, Detergent builder

Phosphate-free detergents, using three surfactants which would be acceptable substitutes for conventional home laundry products, were formulated and evaluated. These surfactants are relatively safe, non-polluting, and biodegradable. The formulations are effective over a considerable water hardness range. Two of the surfactants investigated are about equally capable of yielding detergent formulations of high promise. All formulations contained 20% of the selected surfactant and 2% carboxymethylcellulose. The CMC, a well known soil suspending agent was used ad hoc on the basis of its well-established properties. Possible substitutes or optimum use level were not investigated. Although the point was not pursued as a specific end, indications are that use of these surfactants may lead to detergent formulations of a specific end, indications are that use of these surfactants may lead to detergent formulations of lower basicity than currently in use, rendering them safer and less corrosive. They usually had a pH of about 10. A few at about pH 9 performed quite well. The formulation of choice had good quite well. Ine formulation of choice and good overall detergent properties performing well under all test conditions and is essentially free of poten-tially polluting substances. Limited biological test-ing of these surfactants indicates safety relative to fish toxicity and lack of algal stimulating proper-ties. (Jones-Wisconsin) ties. (Jones W73-02351

A SURVEY OF THE BENTHIC MACROINVER-

A SURVEY OF THE BENTHIC MACKONVER-TEBRATE POPULATIONS IN THE NEW HOPE AND LOWER HAW RIVERS, North Carolina Univ., Chapel Hill. Dept. of En-vironmental Sciences and Engineering. For primary bibliographic entry see Field 05B. W73-02355

ON THE SIGNIFICANCE OF UROCHROME IN ENDEMIC GOITER, Meditsinskii Institut, Gorkii (USSR). Dept. of Hy-

giene. For primary bibliographic entry see Field 05F.

Field 05-WATER QUALITY MANAGEMENT AND PROTECTION Group 5C-Effects of Pollution

W73-02425

SOME STUDIES ON THE CHRONIC TOXICITY OF CADMIUM AND PEXAVALENT CHROMIUM IN DRINKING WATER, Michigan State Univ. East Lansing. Kedzie Chemical Lab.

R. U. Byerrum. In: Proceedings of International Waste Conference, 15th, Purdue University, May 3-5, 1960, p 1-8, 10 tab, 2 ref.

Descriptors: *Water quality, *Public health, *Standards, *Toxicity, *Cadmium, *Chromium, *Potable water, Water pollution effects.

Virtually no data are available on the effects on people or animals of long-term ingestion of small quantities of cadmium and chromium. Results are reported of experiments concerned with the effect reported of experiments concerned win the effect on rats and dogs of concentrations of cadmium and chromium which might be expected to occur in drinking water. While the maximum permissible limit for hexavalent chromium in drinking water is 0.05 ppm in the United States, in view of the fact 0.05 ppm in the United States, in view of the fact that some people in the vicinity of chrome plating industries have been drinking water containing as much as 25 ppm chromate for over three years without apparent ill effects, and in view of the results of these experiments, it would appear that a somewhat higher permissible limit might be established. There is no maximum permissible limit established for cadmium in the United States. However, in consideration of the relatively frequent occurrence of cadmium in drinking water, it would appear that a limit should be established. Because of the accumulation and retention of cadmium in liver and kidney, as shown in this study, the limit should not be above 0.1 ppm and perhaps should be set at a lower level. (Beanderthaps should be set at a lower level.) and perhaps should be set at a lower level. (Bean-AWWARF) W73-02428

THE EFFECTS ON MAN OF LOW CONCEN-TRATIONS OF URANIUM,

Nauchno-Issledovatelskii Institut Gigieny. Moscow (USSR).

Y. U. Novikov, N. N. Pushkina, and A. M.

Tambovtseva. Hygiene and Sanitation, Vol 33, No 6, p 340-344, June 1968. 4 tab, 5 ref.

Descriptors: *Water quality, *Water treatment, *Public Health, Toxicity, *Trace elements, *Uranium, *Epidemiology, Water pollution effects.

Studies were made in two towns, A and B, similar in all ways except uranium content of the drinking water, which was 0.04-0.05 mg/l in A and 0.002-0.004 mg/l in B. The higher content at A was due to so-called fissure water, formed by the passage of rainwater through thick strata of fissured rocks with a pressure content at the passage of the content of the passage with a uranium content somewhat higher than usual. The studies involved uranium tests of 237 samples of drinking water and about 1,800 biochemical tests sensitive to low concentrations in the 56 subjects at A and 65 subjects at B. Tests in the 56 subjects at A and 65 subjects at B. Tests were carried out on protein and vitamin metabolism, as well as kidney and liver functions. The subjects, both A and B, were found to be suffering from a Vitamin C and B deficiency, but the level of such in the blood and urine of both A and B was approximately the same, therefore non-significant in this study. In residents at A the serum albumen content was lower resulting in a statistically significant content was lower resulting in a statistically sig-nificant difference in the albumen/globulin ratio, which was 1.4 at A and 1.8 at B for those who had resided in those towns over 10 years. This dif-ference was not found for those who had so resided less than 10 years. Experimental findings in animals, over 13 months, failed to confirm the observation of changes in the serum protein fractions of subjects living at town A. (Bean-AW-WARF) W73-02429

FISHERIES, COOLING-WATER DISCHARGES AND SEWAGE AND INDUSTRIAL WASTES, Water Pollution Research Lab., Stevenage (En-

gland). J. S. Alabaster, J. H. N. Garland, and I. C. Hart. Water Pollution Research Laboratory, Reprint no 633. (1970), 7 p, 6 ref.

Descriptors: "Thermal pollution, "Freshwater fish, "Industrial wastes, "Sewage, Water pollution, "Water pollution effects, "Heated water, "Cooling water, Cooling towers, Salmonids, Fishmonia, Lethal limit, Trout, Zinc, Lead, Copper, Phenols, Toxicity, Rough fish, Carp, Sunfishes. Identifiers: River Trent (England), Roach, Gudgeon, Bream, Tench.

There are potential dangers to freshwater fish from the lethal effects of sudden exposure to cooling water normally heated 6-9 C above ambient, but at present the chances of fish kills occurring appear to be low. It is also possible that fish living in the winter in heated water could be killed by sudden return to normal temperatures in the event of a power station coming off load, but insufficient information is at present available on which to base a proper assessment. The risk of killing salmonid smolts and adults passing through estuaries receiving heated effluents appears to be small at present. However, the development of well mixed layers or segments of water warmer then normal might act as a partial or complete barrier to the might act as a partial or complete barrier to the passage of fish. The minimum summer temperature at which upstream migrant salmon might be arrested is likely to be no higher than 22.5 C. In rivers containing sewage and industrial wastes the effect of cooling water discharges will depend upon the type and amount of wastes present and the extent to which water circulates through coolht act as a partial or complete barrier to the ing towers where it could gain dissolved oxygen and lose ammonia. In parts of the River Trent, for example, where cooling towers are used, the net effect on water quality and on the status of the fishery appears to be beneficial. (Svensson-Washington) W73-02433

EFFECTS OF HANDLING AND SALINITY ON OXYGEN REQUIREMENTS OF THE STRIPED BASS, MORONE SAXATILIS, Rutgers - The State Univ., New Brunswick, N.J.

M. E. Chittenden, Jr. Journal Fisheries Research Board of Canada, Vol 28, No 12, 1971, p 1823-1830, 2 fig, 4 tab, 20 ref. OWRR B-012-NJ (2).

Descriptors: *Fish conservation, *Striped bass, *Anadromous fish, Water quality, *Dissolved oxygen, *Fish kill, Fish, *Salinity, Bass, Lethal limit, Water pollution effects. Identifiers: Fish responses, Lethal levels, Fish

Oxygen requirements of striped bass, Morone saxatilis, were studied at 0 and 10% salinity using combinations of handling and constantly decreasing oxygen concentrations. Effects of handling ing oxygen concentrations. Effects of handling and salinity on oxygen requirements were negligible or absent. Successive and merging patterns of behavior at low oxygen concentrations were: restlessness, spasmodic swimming, surfacing, inactivity, equilibrium loss, and death. Mean oxygen levels with 99% confidence limits at restlessness, inactivity, equilibrium loss, and death were 1.81 plus or minus .10, 1.28 plus or minus .10, 0.95 plus or minus .06, and 0.72 plus or minus .04 mg/l. Virtually no fish exhibited these behavior patterns until oxygen declined to 3.12, 2.19, 1.44, and 1.04 mg/l, respectively; nearly all fish did at 0.91, 0.66, until oxygen declined to 3.12, 2.19, 1.44, and 1.39 mg/1, respectively; nearly all fish did at 0.91, 0.66, 0.62, and 0.50 mg/1, respectively. Size of fish did not affect oxygen levels at death and equilibrium loss. Ventilation rate was maximum at 2.0-3.0 mg/1 and declined at lower concentrations. Amplitude was maximum at the beginning of inactivity then declined. Because short-term respiratory failure occurred at equilibrium loss, this behavior

probably represents oxygen levels that would cause an abrupt fish-kill. Long-term respiratory failure at inactivity indicated that death would follow a period of resistance. There is no sharp distinction between suitable oxygen concentrations, because duration of exposure determines the intensity of the result even at lethal levels. Onset of restlessness (about 3 mg/l at 16-19 C) probably represents the minimum permissible oxygen level for normal existence. Even this may be insufficient to maintain optimum populations of striped bass.

W73-02435

ANNOTATED BIBLIOGRAPHY OF LAKE ON-TARIO LIMNOLOGICAL AND RELATED STU-

TARIO LIMNOLOGICAL AND RELATED STU-DIES, I. - CHEMISTRY, State Univ., Coll., Buffalo, N.Y. Great Lakes Lab. D. Proto, and R. A. Sweeney. Special Report No. 10, January 1972. 102 p, 187 ref. EPA Grant 16120 HVR.

Descriptors: *Bibliographies, *Lake Ontario,
'Chemical properties, Tributaries, Great Lakes,
Analytical techniques, Instrumentation, Alkalinity, Alkylbenzene sulfonates, Aluminum, Amino
acids, Ammonia, Arsenic compounds, Berrylium,
Biochemical oxygen demand, Bicarbonates, Salts,
Bromine, Cadmium, Calcium, Carbon, Carbon
dioxide, Carbonates, Chemical oxygen demand,
Chlorides, Chlorophyli, Chlorine, Chromium,
Cobalt, Coliforms, Color, Conductivity, Copper,
DDT, Dieldrin, Fluorides, Fulvic acids, Hardness
(Water), Herbicides, Humic acids, Lead, Iodine,
Metals, Mercury, Nitrogen compounds, Odor, Oxgen, Pesticides, Hydrogen ion concentration,
Phenols, Phosphorus compounds, Photosynthesis,
Figments, Phytoplankton, Radioactivity, Oxidation reduction potential, Silica, Dissolved solids,
Salts, Temperature, Turbidity.

Salts, Temperature, Turbidity.

This annotated bibliography was compiled to aid individuals and/or agencies planning or initiating limnological research on Lake Ontario and/or its tributaries, particularly those activities which are part of the international Field Year on the Great Lakes (1972-74). Of the three disciplines compiled-physical, biological, and chemical—the chemical section is presented here. Both the United States and Canadian libraries were surveyed. The subjects dealt with are: study regions, techniques and instrumentation, and parameters. Numbers are listed under these three headings which refer to the abstracts which are alphabetically arranged according to author. The last known address of the author/agency responsible for the paper is listed. Some other references are included which time did not permit abstracting. Unless otherwise noted, the papers cited in the annotated list are located at the Great Lakes Laboratory, Buffalo, New York. Multiple authors are listed with cross references by number to the first author under whose name the paper is abstracted. (Jones-Wisconsin)

CONTROL OF AQUATIC VEGETATION IN FRESHWATER, Department of the Interior, Washington, D.C. Of-

fice of Library Services.
For primary bibliographic entry see Field 04A.
W73-02444

CHEMICAL ASPECTS OF BIOASSAY TECHNIQUES FOR ESTABLISHING WATER QUALITY CRITERIA, Wisconsin Univ., Madison. Water Chemistry Pro-

For primary bibliographic entry see Field 05A.

AN APPRAISAL OF THE PCB SITUATION IN THE STATE OF WISCONSIN, Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.

G. F. Lee.

Descriptor *Polychlor cides, Fish Michigan, al wastes, I Identifiers:

The PCB water and ing the pa prepared v need to es PCBs. The on aquatic at this tim action limi based on specific to to man. Be same limits their gross from Lake less than D aquatic org pounds ten than DDT. receiving i product mu W73-02447

> ZOOPLAN N.J., Lehigh Un and Enviro L. E. Sage, Chesapeak Identifiers: coid, *Nev (N.J.), *Zo

The distri zooplankto died biwee This emba in of th with a sur-crop of 52 May 1970. forms reco prised ove salinity of W73-02448

KINETICS AEROBIC Rhode Isla M. A. Cagl and V. C. I In: Organic p 533-553.

Descriptor conditions, pollution, Hydrogen Growth rat Identifiers ginosa, He

Hydrocarb bility of en of microor into contac microbial G. F. Lee. (Mimeo) October 15, 1971. 6 p.

Descriptors: "Water quality standards, "Polychlorinated biphenyls, "Wisconsin, "Pesticides, Fish, Toxins, DDT, Public health, Lake Michigan, Degradation (Decomposition), Industrial wastes, Municipal wastes, Aquatic life.

The PCB (polychlorobiphenyl) composition of water and fish in Wisconsin has been studied during the past three years. A position paper was prepared which served as a basis for review of need to establish drinking water standards for PCBs. The potential toxicological effects of PCBs on aquatic organisms and man is actively studied at this time. The Food and Drug Administration action limit for PCBs in fish (5 ppm) is largely based on lack of information on any known specific toxicological effects of these compounds to man. Because of this lack of information, the specific to decough a refects of timese compounds to man. Because of this lack of information, the same limits were used for PCBs as for DDT due to their gross similarities in chemical structure. It is their gross similarities in chemical structure. It is recommended that the 5 ppm limit in fish taken from Lake Michigan should not be used as current work on the toxicity of PCBs to man indicates it is less than DDT; however, work on PCB toxicity to aquatic organisms shows that this group of compounds tends to be more toxic to these organisms than DDT. The PCBs are associated with waters receiving industrial and municipal wastes. Industries which cannot control the PCB fate of their product must be restricted. (Jones-Wisconsin) W73-02447

ZOOPLANKTON OF THE SANDY BAY AREA,

N.J., Lehigh Univ., Bethlehem, Pa. Center for Marine and Environmental Studies. L. E. Sage, and S. S. Herman.

L. E., Sage, and S. S. Freiman. Chesapeake Sci. Vol 13, No 1: p 29-39. 1972. Illus. Identifiers: Bays, *Calanoid copepods, Harpacti-coid, *New Jersey, Plankton, *Sandy Hook Bay (N.J.), *Zooplankton.

The distribution and abundance of surface zooplankton in the Sandy Hook Bay area were studied biweekly from May 1969 through May 1970. This embayment is located within the commercially valuable New York Bight. The volumetric mean of the plankton ranged from 0.2-5.3 cc/cu m, with a survey mean of 1.8 cc/cu m. A maximum crop of \$2,002 organisms/cu m was collected in May 1970. Calanoid copepods were the dominant forms recovered in this survey bowever in May May 1970. Caianoid copepods were the command forms recovered in this survey; however, in May, planktonic harpacticoid copepods atypically comprised over 50% of the population. A general salinity classification of the copepods is presented.—Copyright 1972, Biological Abstracts, Inc. W73-02448

KINETICS OF BACTERIAL GROWTH DURING

AEROBIC OXIDATION OF ORGANICS, Rhode Island Univ., Kingston. M. A. Caglar, A. R. Thompson, C. W. Houston, and V. C. Rose. In: Organic Compounds in Aquatic Environments, p. 533-553. Marcel Dekker, Inc., New York, N.Y., 1971.

Descriptors: *Plant growth, *Bacteria, *Aerobic Descriptors: "Plant growth, "Bacteria, "Aerobic conditions, "Oxidation, "Organic compounds, Oil pollution, Biodegradation, Pseudomonas, Hydrogen on concentration, Conductivity, Growth rates, Kinetics.

Identifiers: "Hydrocarbons, Pseudomonas aeru-

Hydrocarbon biodegradation depends upon suita-bility of environmental conditions for proliferation of microorganisms and for bringing hydrocarbons into contact with microorganisms. Mechanisms of microbial oxidation of straight chain paraffins, physicochemical factors affecting it, and microbial

oxidation of n-heptane by pure cultures of a pseudomonad are reported. n-Heptanoate and glucose were used as substrates for comparison. In batch cultures with no external pH control, the eleccultures with no external pH control, the elec-trolytic conductivity was found to decrease with growth. Percent mineral uptake was found to cor-relate with population and rate of mineral uptake to parallel culture growth. In order to study growth kinetics on various substrates, both dilute and kinetics on various substrates, both dilute and dense cultures were used; basis of comparison was specific growth rate. Heptane was volatilized in the air stream and fed into the system in the vapor phase. Changes in growth rate with temperature and aeration rate were more significant for dense cultures growing on heptane than on other substrates; with dilute cultures the changes in growth rate values were about the same order of magnitude for all three substrates. The rate controlling step was creation of sufficient interfacial area for rapid mass transfer of heptane to the cells and for uniform distribution of heptane which is sparingly soluble. (Jones-Wisconsin) W73-02449

KINETICS OF BIOLOGICALLY MEDIATED KINETICS OF BIOLOGICALLY MEDIATED
AEROBIC OXIDATION OF ORGANIC COMPOUNDS IN RECEIVING WATERS AND IN
WASTE TREATMENT,
Harvard Univ., Cambridge, Mass.
E. Stumm-Zollinger, and R. H. Harris.
In: Organic Compounds in Aquatic Environments,
p 555-598. Marcel Dekker, Inc., New York, N.Y.
1071

Descriptors: *Laboratory tests, *Cultures, *Aero-bic conditions, *Oxidation, *Microorganisms, Or-ganic compounds, Kinetics, Growth rates, Microbiology, Waste treatment, Bioassay, Bac-teria, Nutrients, Plant growth, Metabolism. Identifiers: *Aerobic oxydation, Chemostat, Sub-

Although it is important to measure the kinetics of dissimilative activities of individual bacterial groups, it is also necessary to assign to these groups a position of relevance in the natural system. The significance of the continuous growth system as a tool in aquatic microbiology is demonstrated by its usefulness in various study areas. The chemografit is mirely for the control of the chemografit is mirely for the control of the The chemostat is suitable for assay of organic compounds at the relatively small concentrations typically encountered in natural waters. The kinetics of microbially mediated aerobic oxidation of organic compounds is initially considered on the cellular level. Growth characteristics of organisms isolated from natural waters and of laboratory stock cultures are compared and discussed in rela-tion to the typically low substrate concentrations in natural waters. A discussion of mutual substrate interference follows where it is shown that sequential substrate dissimilation is observed in complex media at low substrate concentrations. The discussion is extended to systems containing heterogeneous communities of organisms where mixed microbial populations often behave like pure cultures. It is demonstrated that water quality and structure of the microbial community are im portant determinants of the kinetics of microbial dissimilatory activities. There is no reason, in principle, to distinguish between fresh water and marine microbiology. (Jones-Wisconsin) W73-02450

OXIDATION-REDUCTION POTENTIALS, OXYGEN CONCENTRATION AND OXYGEN UPTAKE OF PROFUNDAL SEDIMENTS IN A

EUTROPHIC LAKE, Copenhagne Univ. (Denmark). Freshwater Biological Lab.

B. T. Hargrave. Oikos, Vol 23, No 2, p 167-177, 1972. 5 fig, 4 tab, 27 ref.

Descriptors: *Analytical techniques, *Oxidation-reduction potential, *Oxygen, *Sediments, *Mea-

surement, Profundal zone, Eutrophication, Lakes, Depth, Sands, Aeration, Stratification, Sulfur compounds, Anaerobic conditions. Identifiers: *Oxygen uptake, Oxygen concentra-tion, Lake Estrom (Denmark).

The relation between Eh value, oxygen concentration and oxygen uptake in sediments is examined and usefulness of sediment Eh profiles as an index and usefulness of sediment Eh profiles as an index of oxygen penetration and uptake is considered. Oxidation-reduction potentials were measured (two vertical series of readings) with a 1 mm platinum electrode in different places of undisturbed sediment cores and resettled mud from Lake Estrom, Denmark. At aerobic-anaerobic interface slow stabilization of Eh potentials occurred. Seasonal changes in Eh profiles only occurred in the upper I cm during summer stratification in profundal sediments. When oxygen disappeared, reducing conditions reached the sediment surface. In artificial mud-water systems, no measurable oxygen occurred when Eh values fell below +100 mv in either sediment, water, or both. From various depths of sediment cores, oxygen uptake by mud was inversely related to Eh potenuptake by mud was inversely related to Eh poten-tial. Eh and square root of oxygen uptake by sub-surface mud during aeration showed a similar in-verse proportionality, suggesting a relationship between intensity and capacity of oxygen con-sumption. Sediment oxygen uptake from the sur-face of undisturbed cores was reduced 80% by for-malin addition. All oxygen below 1 cm was conuptake by mud was inversely related to Eh po sumed by chemical processes. Eh potential may index both the intensity and capacity of such reac-tion. (Jones-Wisconsin) W73-02451

INVESTIGATIONS ON NUTRIENT FACTORS LIMITING PHYTOPLANKTON PRODUCTIVITY IN TWO CENTRAL VIRGINIA PONDS, Virginia Commonwealth Univ., Richmond. G. L. Samsel, Jr., J. R. Reed, and H. J. Winfrey. Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 825-833, 1972. 6 tab, 9 ref.

Descriptors: *Limiting factors, *Nutrients, *Phytoplankton, *Productivity, *Ammonia, *Virginia, Ponds, Photosynthesis, Chemical properties, Europhication, Physical properties, Chiorophyll, Trophic level, Laboratory tests, Primary productivity, On-site investigations. Identifiers: Hanover County (Va).

Effects of nutrient enrichment on phytoplankton productivity in two adjacent, physically similar central Virginia oxidation ponds, exhibiting dif-ferent trophic features, were correlated. At regular intervals, by C-14 and chlorophyll enrichment bioassay, some of the nutrients, particularly ammonia and phosphate, were evaluated. The ponds were identical excepting in their trophic features thus making them ideal for comparing ammonia vs. phosphate as a critical nutrient factor for phytoplankton productivity. Preliminary com-parisons of the phytoplankton, their production, and the chemical characteristics of the water were determined. Ammonia, phosphate, nitrate, iron, carbon dioxide, silica and chloride differed most carbon dioxide, silica and chloride differed most markedly among the various nutrients analyzed. Investigations were continued to compare the validity, using field and laboratory ecosystems to predict changes in trophic levels. Microecosystems resembling both ponds sufficiently to perpetuate the exact phytoplankton communities were established in the laboratory. These allowed additional testing of nutrients influencing the observed trophic differences. In situ, plastic cylinders and on shore one gallon battery jars were also employed in each pond to better determine effects of ammonia on primary productivity rates under natural conditions. The view is supported that ammonia is a key factor regulating supported that ammonia is a key factor regulating 'trophic' features in these two ponds. (Jones-

Group 5C-Effects of Pollution

EFFECTS OF AN ORGANOPHOSPHORUS IN-SECTICIDE ON THE PHYTOPLANKTON, ZOOPLANKTON, AND INSECT POPULATIONS OF FRESH-WATER PONDS, California Univ., Berkeley. Dept. of Entomology

California Univ., Bossand and Parasitology. S. H. Huribert, M. S. Mulla, and H. R. Willson. Ecological Monographs, Vol 42, No 3, p 269-299, 1972. 12 fig., 4 tab, 80 ref.

Descriptors: *Organophosphorus compounds, *Insecticides, *Phytoplankton, *Zooplankton, *Insects, Population, Freshwater, Ponds, Her-bivores, Crustaceans, Rotifers, Beathos, Eutrophication, California, Cyanophyta. Identifiers: Asplanchna brightwelli, Cyclops, Dur-sban, Bakersfield (Calif.), Predaceous insects, Tadpole shrimp, Cannibalism, Polymorphism.

Tadpole shrimp, Cannibalism, Polymorphism.

The influence of an insecticide on competitive plant-herbivore or prey-predator interactions of aquatic populations is documented as demonstrated by phytoplankton and invertebrate populations of small fresh-water ponds treated with the insecticide Dursban. By stimulating algal blooms and reducing predaceous insect populations, Dursban created an ecological imbalance apparently favorable to the very insects it was meant to control. Extent to which these effects aggravate mosquito-control problems will vary according to circumstances. If toxic blooms of blue-green algae prove a frequent result of insecticide treatment, then use made of a body of water by livestock and vertebrate wildlife will be a second important factor determining whether a given insecticide treatment will cause more problems than it solves. The Dursban treatments provided numerous insights into phytoplankton-zooplankton, rotifercrustacean, and prey-predator relationships and into the significance of polymorphism in Asplanchan. Insecticides and other possons are valuable tools for investigation of aquatic ecosystems. Reduction of herbivorous crustaceans by Dursban Reduction of herbivorous crustaceans by Dursban able tools for investigation of aquatic ecosystems.
Reduction of herbivorous crustaceans by Dursban secuction of herbivorous crustaceans by Dursban and restraint of herbivorous rotifers by Asplanchan predation permitted rapid increase of phytoplankton populations in treated ponds. Six weeks after the last treatment, the phytoplankton was 2 and 16 times more abundant in low dose and high dose ponds, respectively. (Jones-Wisconsin) W73-02453

PROCEEDINGS 1971 TECHNICAL CON-FERENCE ON ESTUARIES OF THE PACIFIC NORTHWEST

Oregon State Univ., Corvallis. Engineering Experiment Station.

Circular No 42, 1971. 343 p, 105 fig, 11 tab, 119 ref.

Descriptors: *Estuaries, *Pacific Northwest U.S., Engineering structures, Institutional constraints, Federal government, Model studies, Water quality, Benthos, Legal aspects, Water law, Dyereleases, Analytical techniques, Analog models, Mathematical models, Remote sensing, Industrial wastes, Legislation, Sediment transport, Water resources development, Management, Hydrology, Marinas, Navigation.

To review the problems involved in the preserva-tion and proper utilization of the Pacific Northwest estuaries, speakers were invited to cover subjects ranging from legal-political aspects to emphasis on estuarine technology. Sessions were devoted to modeling, hydrodynamics, sedi-ment transport, estuarine ecology, and state and legal policies and standards affecting estuarine development. Texts presented covered the follow-ing subjects: The potential of physical models to investigate estuarine water quality problems; Apinvestigate estuarine water quality problems; Applications of some numerical models to Pacific Northwest estuaries; Mathematical modeling of restuarine benthal systems; Remote sensing acquisition of tracer dye and infrared imagery information and interpretation for industrial discharge management; Legal protection of the Pacific Northwest estuaries; Studies of sediment transport in the Columbia River estuary; A study of sediments from Bellingham Harbor as related to marine disposal; Hydroecological problems of marinas in Paget Sound; Marine aids to navigation-selection and design; Historical changes of estuarine topography with questions on future management policies; Effects of institutional contractivities of sections and sections of convents in the section of the sectio management policies; Effects of institutional constraints and resources planning on growth in and near estuaries; Recent federal policies affecting marine science and engineering developments. (See W73-02455 thru W73-02466) (Auen-Wiscon-W73-02454

THE POTENTIAL OF PHYSICAL MODELS TO INVESTIGATE ESTUARINE WATER QUALITY

PROBLEMS, Army Engineer Waterways Experiment Station, Vicksburg, Miss. H. B. Simmons. In: Technical Conference on Estuaries of the Pacific Northwest 1971. Oregon State University, Corvallis. Regineering Experiment Station Circu-lar, No 42, p 4-28. 21 fig.

Descriptors: "Estuaries, "Model studies, "Analytical techniques, "Prototypes, Hydraulic similitude, Dye dispersion, Dye releases, Channel improvement, Jetties, Navigation, Water quality, Shoots, Saline water barriers, Water pollution, Tides, Oregoo, Washington, Pacific Northwest U. S., Columbia River.

Columbia River. Identifiers: Flushing, New York Bay, San Fran-cisco Bay, Umpqua River (Wash.), Tillamook Bay (Wash.), Gray's Harbor (Wash.), San Diego Bay.

(Wash.), Gray's Harbor (Wash.), San Diego Bay.

Physical models for water quality investigations are described and illustrated. Possibly because the Pacific Northwest was developed and exploited at a much later date than were the Atlantic and Gulf Coasts and consequently has been exposed to manmade pollutants for a lesser period of time, greater use was made of physical models for water quality studies in the Atlantic and Gulf regions than in the Pacific Northwest, thus emphasizing that more investigations should be conducted before estuarine pollution becomes critical in this area also. The functions of four physical models of the Columbia River, the Umpqua River, Gray's Harbor, and Tillamook Bay are discussed. They have been verified to reproduce tides, tidal and river currents, and salinities for prototype conditions. Tests of pollutant release and dispersion have been conducted to simulate flushing capabilities. Salinity intrusion, navigation, dredging, and shoaling problems are typical of the studies conducted on these models of San Francisco Bay, San Diego Bay, and New York Bay are pointed out. (See also W73-02454) (Auen-Wisconsin)

APPLICATIONS OF SOME NUMERICAL MODELS TO PACIFIC NORTHWEST ESTUA-

RIES, Pacific Northwest Water Lab., Corvallis, Oreg.

R.J. Callaway.

In: Technical Conference on Estuaries of the Pacific Northwest 1971, Oregon State University, Corvallis, Engineering Experiment Station Circular No. 42, p 29-27. 17 fig. 3 tab, 63 ref.

Descriptors: "Mathematical models, "Model studies, "Estuaries, "Circulation, Physicochemical properties, Water pollution effects, Advection, Diffusion, Equations, Hydraulic properties, Computer models, Pacific Northwest U.S., Hydrography, Tides, Statistical models. Identifiers: Steady-state models, Time variable models, Box models, Flushing.

A broad view of models on estuarine physical processes is presented. Examples of model use range from a slide rule approximation of flushing to a time varying digital computer solution of an

estuary-river system. Model application to Pacific Northwest estuaries serves to point out the usefulness of steady-state methods while anticipating full scale, or at least two-dimensional simulation of rather small but complex systems. If the problems relating to estuaries are to be solved before a succession of disasters affects them, then recourse will have to be made to models. Model complexity has no real bounds but the simplest, largest scale model should be used to attack existing problems rather than devote too much attention to a virtually limitless collection of microcosmic structures. Physical-chemical features of some Oregon and Washington estuaries are discussed in relation to existing or potential pollution problems. Available mathematical models of flow and dispersion phenomena are reviewed and applications of steady-state, timevariable, and box models are presented. The effects of estuaries on oceans are illustrated via examples of the Columbia River and Cook Inlet. (See also W73-02454) (Auen-Wisconsin)

MATHEMATICAL ESTUARINE BENTHAL SYSTEMS,
Oregon State Univ., Corvallis. Dept. of Civil En-D. A. Bella.

D. A. Bella.

In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 98-125. 2 fig, 22 ref.

Descriptors: *Mathematical models, *Estuaries, *Benthos, Dissolved oxygen, Sulfides, Organic compounds, Sulfates.

compounds, Sulfates.

Benthal systems, particularly those in tidal flat regions, are discussed. Their behavior depends not only on the relationship of their sub-systems but also on the relationship of the benthal systems within the larger estuarine systems. The mechanisms within the benthal systems are described in a mathematical model which gives the relationships between soluble organics, insoluble organics, sulfates, dissolved oxygen, and free sulfides within the deposits and overlying waters. The concepts concerning the processes that occur within the estuarine benthal system are expressed quantitatively. The limitations of the concepts, of course, are not removed when these concepts are put in mathematical form; thus proper use of the model involves a continual evaluation of its limitations. The model, hopefully, will permit development of new concepts which arise by the interaction of the basic concepts from which the model was built. The intention is that use of this model together with field and laboratory studies will lead to a better understanding of the estuarine benthal to a better understanding of the estuarine benthal system and, particularly, the influence of man's activities on this system. (See also W73-02454) (Jones-Wisconsin)

LEGAL PROTECTION OF THE PACIFIC NORTHWEST ESTUARIES, Environmental Protection Agency, Portland, Oreg. Water Quality Office.
N. H. Grubbe.
In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 173-189.

Descriptors: *Legislation, *Pacific Northwest U.S., *Estuaries, Local governments, Federal jurisdiction, Water quality standards, State jurisdiction, Dredging, Administration, Pulp and paper industry, Oil spills, Columbia River, Judicial desions, Permits, Common law, Social participation, Regulation, Pulbic rights, Federal Water Pollution

Control Act 'Environmental Protection Agency, Puget Sound (Wash.), National Environmental Policy Act.

The prese gencies th mental Pro agencies, a quality star water qui defining cr schedules. schedules.
of treatmer
case basis
made by t
new legisla
of all mat
ment; high
ment which lows, near Engineers restricted. ment Act o fect upon National E tional Fed Congress. W73-02459

> CHARACT AREAS O BODIES O Kiev Rese giene (USS Ž. I. Zhold Gidrobiol Identifiers 'blooming' *Cyanoph The conte

voir was : The volati life activit simple vol thymols ar in chlorin Abstracts, W73-0246

A STUD MARINE Internation Lab J. A. Servi In: Techr Pacific No Corvallis, lar No 42,

Descriptor cal oxyge monids, l Commerc dumps, W mental en Identifiers

It was pro

Harbor, V Island, W was on the River soon responsible Fisheries mended a primarily

The present and proposed legal protection of estuaries is summarized. There are 40 or more agencies that exercise some legal jurisdiction over the Pacific Northwest estuaries, with the Environmental Protection Agency in the forefront. Local agencies, state governments, Congress, and the public are concerned. The regulation of water quality standards in interstate and coastal waters is carried out by first establishing state and Pederal water quality standards, classifying streams, defining criteria, and establishing implementation schedules. The implementation and construction of treatment facilities is worked out on a case-bycase basis. Important recommendations were made by the Council on Enfironmental Quality; new legislation, ban of unregulated ocean dumping of all materials harmful to the marine environment; high priority to protect the marine environment which is biologically active (estuaries, shallows, nearshore areas); dredging by the Corps of Engineers of highly polluted areas has been restricted. The Federal Water Quality Improvement Act of 1970 established the current requirements for the handling of oil svills. A beneficial efrestricted. The Federal Water Quality Improve-ment Act of 1970 established the current require-ments for the handling of oil spills. A beneficial ef-fect upon the care and feeding of wetlands is the National Environmental Policy Act of 1970. Addi-tional Federal statutes have been introduced in Congress. (See also W73-02454) (Jones-Wisconsin) W73-02459

CHARACTERIZATION OF PHENOLS IN AREAS OF WATER 'BLOOMING' IN OPEN BODIES OF WATER, Kiev Research Inst. of General Communal Hy-

Nev Research inst. of General Communal Hy-giene (USSR), and V. N. Kozitskaya. Z. I. Zholdakova, and V. N. Kozitskaya. Gidrobiol Zh. Vol 7, No 3, p 80-83, 1971. Identifiers: "Algae, "Phenols, USSR, "Water 'blooming', "Kermenchug Reservoir (USSR), "Cyanophyta.

The content of phenols in the Kremenchug Reservoir was studied in association with 'blooming.' The volatile phenols appearing as a result of the life activity of blue-green algae did not contain simple volatile compounds such as carbolic acid, thymols and cresols, which give off specific odors in chlorinated water.—Copyright 1972, Biological Abstracts, Inc. Abstracts, Inc. W73-02460

A STUDY OF SEDIMENTS FROM BEL-LINGHAM HARBOR AS RELATED TO

MARINE DISPOSAL, International Pacific Salmon Fisheries Commission, Cultus Lake (British Columbia). Cultus Lake

J. A. Servizi. J. A. Servizi.
In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 227-248. 6 fig. 4 tab, 8 ref.

Descriptors: "Harbors, "Sediments, "Dredging, "Washington, "Disposal, Pulp wastes, Biochemical oxygen demand, Turbidity, Toxicity, Salmonids, Hydrogen sulfide, Fisheries, Landfills, Commercial fishing, Fish migration, Waste dumps, Water quality, Herrings, Crabs, Environmental engineering, Navigation.

Identifiers: "Bellingham Harbor (Wash.).

It was proposed in 1968 that a part of Bellingham Harbor, Watcom Waterway, be dredged and the sediment dumped in an area southeast of Lummi Island, Washington. The proposed disposal area was on the general migratory routes of Fraser River sockeye and pink salmon, which are the responsibility of the International Pacific Salmon Fisheries Commission. Possible harm to these fisheries was studied and alternatives recommended as the conditions of the disposal site were considered adverse. Two types of sediment were considered adverse. Two types of sediment were involved—that from the inner harbor consisted primarily of putrifying pulp fibers which exert a significant oxygen demand, create substantial turbidity, and are toxic to juvenile sockeye salmon because of their hydrogen sulfide content. Methods of widespread dispersal to dilute the sedi-ment appeared impractical, thus it was concluded that land disposal of inner harbor sediment would be necessary to protect fish stocks. Sediment from be necessary to protect fish stocks. Sediment from the outer harbor was a natural sitt, not containing hydrogen sulfide, but exerted an oxygen demand and created a highly turbid mixture which settled very slowly. Instead of dumping at the proposed site, hydraulic dredging and local disposal ad-jacent to the outer harbor were recommended. (See also W73-02454) (Jones-Wisconsin)

HYDRO-ECOLOGICAL PROBLEMS M. RINAS IN PUGET SOUND,
Washington Univ., Seattle. Dept of Civil En-

Washington Carlotter Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 249-271. 12 fig, 10 ref.

Descriptors: "Design standards, "Design criteria,
"Marinas, Shore protection, "Washington,
Planning, Water quality, Shellfish, Navigation,
Management, Fish migration, Harbors, Tides,
Structures, Boating, Estuaries, Sediment transport, Judicial decisions, Hydrology, Ecology,
Mathematical models, Coastal structures.
Identifiers: "Puget Sound (Wash.), Shoreline
development, Bulkheads.

Attention is called to the factors of water quality, Attention is called to the factors of water quality, the accommodation of shellfish and migratory fish, navigation, shoreline equilibrium and management, which may influence the planning and hydraulic design of the small harbors and marinas expected to be added during growth of shore facilities resulting from a regional growth forecast in pleasure boating in the Pacific Northwest. New environmental awareness and concerns relating to use of water-related resources will require that designers of these facilities con-sider features that are not yet a part of convenal practice. Ecological parameters need to be added to those used more traditionally for water-oriented structures. Major points concerning marinas relate to limits on the seaward protrusion of shore-connected structures and the requirement for better wave circulation. The two prediction models for assessing circulations due to tidal effects were developed, the second model showing that neglecting the exit loss would be a permissible assumption in most instances. These new criteria woven into the existing planning and design procedures in quite the same way as any other new regulation on navigation, safety, etc., would be handled. (See also W73-02454) (Jones-Wisconsin) W73-02462

MARINE AIDS TO NAVIGATION - SELECTION

AND DESIGN, Coast Guard District (13th), Seattle, Wash. Civil

Engineering Branch.
C. L. Clark.
In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 272-296. 11 fig, 2 tab.

Descriptors: *Navigation, *Lighthouses, *Design, Columbia River, Economics, Estuaries, Ranges, Light, Buoys, Recreation, Radar, Public benefits,

Identifiers: *Navigation aids, Daybeacons

In addition to protecting life and property of mariners, our modern system of marine aids plays a key role in preserving the environment for everyone dependent on estuaries for economic and recreational support. Selection of a specific aid is governed by operational criteria plus physical

characteristics of the station. On an estuary like the Columbia River, types encountered by the mariner include lighted and unlighted buoys, lighted structures, daybeacons, and ranges. Each will provide one or more of the following audio/visual services: daymark with visual identification, audible signal. Several basic principles are involved in establishing and maintaining the system. Along coasts and navigable waterways and aboard stationary vessels they enable navigators to determine their position with relation to land, visible objects, and isolated dangers; to follow natural and improved channels; and to determine their position with relation to land, visible objects, and isolated dangers; to follow natural and improved channels; and to determine their position on the high seas. Varying locales and navigators require different types of aids. The armed forces and permanent and substantial commerce must be served; public benefit must be justified; a uniform, simple method of identification and distinction of one aid from another must be provided. (See also W73-02454) (Jones-Wisconsis). W73-02463

HISTORICAL CHANGES OF ESTUARINE TOPOGRAPHY WITH QUESTION OF FUTURE MANAGEMENT POLICIES, Oregon State Univ., Corvallis. Dept. of Oceanog-

raphy.
J. B. Lockett.

I.B. Decent.
In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular No 42, p 297-311. 3 ref.

Descriptors: "Estuaries, "History, "Topography, "Management, Estuarine environment, Columbia River, Coasts, State governments, Federal government, Planning, Water quality, Research priorities, Pacific Northwest U. S., Comprehen-sive planning, Long term planning. Identifiers: "Coastal zone mangement.

The ephemeral nature of the estuarine environment requires that intelligent management be em-ployed to preserve and develop its special resources. Questions relating to future coastal zone management policies are discussed as requisite to development of an effective manage-ment plan. The tools for coastal and estuarine management are identified and analyzed. Evaluation of recreational use and potential is difficult, particularly in the fields of beauty, cleanliness, and personal enjoyment. Basic research is a badly needed and essential tool for development of an intelligent management plan. Goals or objectives may stress water quality improvement, exploita-tion of biological resources, preservation of scenic attractions, and attainment of maximum recreational potential. Goals and objectives are essential choices that must be made, first at the local level and later from the overall position of the state and Federal levels. Physical characteristics of each estuary should be studied and the relationship of these characteristics to the integrated desires of the several governments. A management system for the coastal zone provides only a framework for proper development. Full potential will be realized when science and technology, coupled with imagination and sound management make existing uses more efficient and new beneficial uses are developed. (See also W73-02454) (Jones-Wisconsin) W73-02464

EFFECTS OF INSTITUTIONAL CONSTRAINTS AND RESOURCES PLANNING ON GROWTH IN AND NEAR ESTUARIES, Battelle Memorial Inst., Richland, Wash. Pacific

Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs. M. H. Karr, and G. L. Wilfert. In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circu-lar No 42, p 312-324. 1 fig.

Group 5C-Effects of Pollution

Descriptors: *Institutional constraints, *Planning, *Estuaries, Economics, Management, Social values, Washington, Legislation, Governments, Political aspects, Recreation, Fulbic rights, Comprehensive planning, Local governments, Regional development. Identifiers: *Shoreland management, Resources management, Gray's Harbor (Wash.).

Key components of the planning process and their interrelationship are presented with a simplified version of the steps considered essential if resources management is to be responsive to public needs and desires. Nature and extent of the resources available in the region must be determined and then an in depth analysis of present use and control of the resources can form the basis for development of trends and projections of future need and uses and determination of adequacy of the resources to meet those needs. Identification and evaluation of consequences of alternative and evaluation of consequences of alternative courses of action are required. Finally, an impor-tant requirement for successful resources managetant requirement for successful resources management is involvement of the public continuously throughout the planning process. Consideration of institutional constraints is an integral part that must be treated in an iterative fashion with all other significant factors. Many of the institutional constraints now evolving relative to estuaries and shorelands recognize that there could be detrimental long-range effects if shoreland management is not compatible with the overall resources management philosophy. The only way to insure compatibility is to develop shoreland management policies in concert with development of policies for the entire region. (See also W73-02454) (Jones-Wisconsin) sin) W73-02465

RECENT FEDERAL POLICIES AFFECTING MARINE SCIENCE AND ENGINEERING DEVELOPMENT, National Council on Marine Resources and En-

National Council on Marine Resources and Engineering Development, Washington, D.C. E. L. Dillon.
In: Technical Conference on Estuaries of the Pacific Northwest, 1971. Oregon State University, Corvallis, Engineering Experiment Station Circular, No 42, p 325-341.

Descriptors: *Water pollution control, *Federal Descriptors: "water pollution control, "Federal government, "Oceanography, "Engineering, Coasts, Waste disposal, Oil pollution, Estuaries, Beaches, Powerplants, Coastal structures, Land use, Marshes, Wetlands, Water pollution, Fishe-ries, Recreation, Legislation, Land reclamation, Economics, Land development, Land use, Regional development, State governments, Oil spills, Standards, Research and Development. Identifiers: *Coastal zone management, National Land Use policy, Ocean dumping, Marine pollu-

The total Federal effort oriented toward marine science and engineering problems is outlined. Federal legislation and budgeted funds are substantial and increasing. The National Land Use Policy, with emphasis on the coastal zone, concerns waste disposal at sea, oil pollution of beaches and estuaries, necessary power require-ments, coastal zone construction, land requirements met by filling of wetlands, marshes, and other marine areas, contamination of fishery other marine areas, contamination of instery products, and recreation. Need for knowledge and equipment to insure development of this valuable environment for proper allocation is discussed. There are many, varied and often conflicting uses of the marine environment. Careful analysis must of the marine environment. Careful analysis must be made of questions of site suitability, whether land or water, priority of public needs, and cost/benefit ratio or return on investment. Not only are uses of the coastal zone conflicting but even the standards by which we determine use also conflict. This year (1971) the Federal govern-ment is devoting close to \$50 million for marine science, technology and service related to development and conservation of the coastal zone.

Additionally, the Defense Department and other Federal agencies conduct coastal programs closely related to marine science and technology. (See also W73-02454) (Jones-Wisconsin)

MATHEMATICAL DESCRIPTION OF BIOLOG-ICAL AND PHYSICAL PROCESSES HEATED STREAMS, Rutgers - The State Univ., New Brunswick, N.J. R. C. Ahiert.

R.C. Aniert. American Institute of Chemical Engineers Symposium Series, Vol 68, No 124, p 191-201, 1971. 9 fig, 6 tab, 32 ref.

Descriptors: *Mathematical models, *Hydrothermal studies, *Physical properties, Biology, Heated water, Streams, Biochemical oxygen demand, Temperature, Reaeration, Diffusivity, Velocity, Mixing, Heat transfer, Water pollution effects, Dispersion, Oxygen sag, Downstream. Identifiers: Temperature dependency, Energy balance, Mass balance, Carbonaceous exygen demand.

A general model for mixing and dispersion in the downstream zone of a point of heated effluent injection is described. Velocity profiles and termperature distributions are a satisfactory basis for a fully distributed parameter model of processes taking place in the zone. Principal measures of stream quality are carbonaceous oxygen demand and oxygen concentration. The principal source of oxygen replenishment in unsaturated streams is transport across the air-water interface. The carbonaceous oxygen demand kinetics are described as first-order in rate, an outgrowth of simplified descriptions of data from standardized laboratory bottle tests. A relative view of the activity of th bacterial community as a function of position in the region downstream of a heated effluent is represented. Accumulated carbonaceous oxygen demand corresponds to a point in the mixing zone equivalent to 90% of thermal equilibrium. All three proposed models are in excellent agreement. There is a significant variation, with time, in both substrate compositions and the bacterial communities that metabolize the dissolved organics; the variations are manifest through large differences variations are manness through large interestics in rate constants generated for the simplified first-order model. Application of distributed-parameter chemical reactor analysis to process taking place in streams appears to be logical and valid. (Auen-Wisconsin) W73-02468

MULTIVARIATE APPROACHES TO ALGAL STRATEGIES AND TACTICS IN THE SYSTEMS ANALYSIS OF PHYTOPLANKTON, Wisconsin Univ., Madison. Dept. of Botany. T. F. H. Allen, and J. F. Koonce.

Memo Report No 72-24 (Preprint), Eastern Deciduous Forest Biome, May, 1972. 52p, 12 fig, 2 tab, 32 ref. 16010 EHR.

Descriptors: *Analytical techniques, *Computer programs, *Algae, *Phytoplankton, Biological communities, Standing crops, Wisconsia, Primary productivity, Systematics, Growth rates, Biomass, Data collections. Identifiers: *Lake Wingra (Wis.), Multivariate analysis, Ordination analysis.

Traditionally, phytoplankton data are organized on chronological axes; the power of multivariate analyses of the type employed here lies in their ability to organize species data into natural groups not necessarily conforming to chronological groups or, indeed, any other imposed structure. A logarithmic transformation is often appropriate to phytoplankton data because these plants can grow exponentially. A presence/physical transformation. exponentially. A presence/absence transform ignores standing crops and gives information as to species tolerances rather than species optima. Cer-tain transformations, in which data are relativized,

give equal weight to rare and common species give equal weight to rare and common species while preserving many quantitative aspects. By using several transformations and analyses insight has been gained into different ecological aspects of phytoplankton, and the biological implications of certain data transformations. At weekly intervals, March 1970 until FEBRUARY 1971, WATER SAMPLES WERE COLLECTED FROM THREE DEPTHS AT ONE STATION IN Lake Winger Wisconsin for estimation of manifest of the property of the property of the state of the stat FROM THREE DEPTHS AT ONE STATION IN Lake Wingra, Wisconsin for estimation of primary production, identification and enumeration of phytoplankton species, and determination of important water chemistry parameters. A distinction is drawn between algal tactics, which give the plant the ability to exist in a particular environmental situation, and algal stratugare environmental situation, and algal stratugares, which define the organisms' place in the community. (Jones-Wisconsin)
W73-02469

THE ADHESIVE PROPERTIES OF CHLOREL-LA VULGARIS, AND THE ENHANCEMENT OF THIS ADHESION BY SUBSTANCES FOUND IN AMBIENT SEA WATER,
Puerto Rico Univ., Mayaguez. Dept. of MARINE

Sciences.
T. R. Tosteson, and L. R. Almodovar.
Available from the National Technical Information Service as AD-742 121. \$3.00 in paper copy, \$0.95 in microfiche. Office of Naval Research, Technical Report No 2, April, 1972. 28 p, 11 fig, 18 tab, 1 append. NOOO14-70-C-0281, TASK, NR306-849.

Descriptors: *Adhesion, *Chlorella, *Sea water, *Marine biology, Cytological studies, Biochemis-

Identifiers: Nucleosides, Colcemid, Thymidine, Artificial substrates, Cell growth, Marine bio-foul-ing, Cell blocking agents, Cellular exudate.

The mechanism of the deposition and subsequent adhesion of planktonic algal cells to artificial surfaces was ascertained and the effect of substances found in ambient sea water that affect this association determined. To evaluate these two aspects, experimental systems with Chlorella vulgaris cells were used. The results demonstrate the primary role of the cellular exudates in the adhesive properties, which is directly dependent on the availability of thymidine. The material is either produced by the cell during the G2 phase of the cell cycle, or accumulates on the cell surface in sufficient concentration by that time to effect adhesion. The adcentration by that time to extect adhesion. The ad-hesive property is of fundamental importance in the colonization of inanimate surfaces in the marine environment. Sea water samples from a coastal bay area of high productivity contained material that enhances adhesion of Chlorella to material that eminances audiented to Christian uplastic surfaces pre-exposed to solutions of the extracted material. It appears organic, with some bound' calcium, silicon and sodium, and affects adhesion of the Chorella cell similarly to the exudate produced by this cell. These extracted materials might be produced by marine algae themselves.

(Jones-Wisconsin) W73-02470

ALGAL NITROGEN FIXATION IN TEM-PERATE REGIONS, Uppsala Univ. (Sweden). Inst. of Physiological

Botany. E. Henriksson.

Plant and Soil, Special Volume, p 415-419, 1971. 1

Descriptors: *Algae, *Nitrogen fixation, *Soils, *Temperate, Climatic zones, Cyanophyta, Symbiosis, Lichens, Nitrogen, Light intensity, Temperature, Anabaena, Bacteria, Photosynthesis. Identifiers: Sweden, Collema, Peltigera, Nostoc.

A few earlier investigations of nitrogen-fixation by blue-green algae in temperate soils are reviewed including recent studies on the occurrence of

potential nitro soil types on v tion by algae is made from Ap day. Good nit was observed Fixation occur both the light which it was n ture condition fixation. The l served in soils explained by t Anabaena and converted to itrogen. Data tribute to the t northern temp and in symbic W73-02471

NITROGEN F London Univ London (Engl G. E. Fogg. Plant and Soil tab, 24 ref.

Descriptors: Cyanophyta, Phytoplanktor monia, Nitra Plankton, Der Identifiers: *\ Benthic blue-For valid esti-

in a year, de horizontal an blue-green pl when the alg open waters t fixation is ge heterocystou dent. Fixation presence of although nitr nitrogen are direct relatio ncentration lake surface early eutroph cal nitrogen nitrogen budg but at certain may contribu frequently beenabling high wise be possi W73-02472

ALGAL NIT ICS, Seijo Univ., A. Watanabe Plant and So fig, 4 tab, 25

Descriptors: regions, Ric perature, Cr sis, Africa, A Identifiers:

me recent rice fields, blue-green a blue-green a tropical and

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Effects of Pollution-Group 5C

potential nitrogen-fixing algae in several different soil types on various continents. In the summer of 1969 an investigation was made of nitrogen fixation by algae in Swedish soils. Measurements were made from April to October at various times of the day. Good nitrogen fixation by blue-green algae was observed during the whole experimental time. Fixation occurred at about the same rate during both the light and dark periods of each day on which it was measured. Neither light nor temperature conditions greatly influenced rate of nitrogen which it was measured. Neither light nor temperature conditions greatly influenced rate of nitrogen
fixation. The low rates of fixation frequently observed in soils containing free-living algae may be
explained by the fact that the cells of the species
Anabaena and Nostoc in soils can very easily be
converted to spores (akinetes) which do not fix
nitrogen. Data show that blue-green algae can contribute to the total nitrogen economy of soils in the
northern temperate zone both as free-living cells
and in symbiotic associations in lichens. (JonesWisconsin) W73-02471

NITROGEN FIXATION IN LAKES, London Univ. (England); and Westfield Coll., London (England). Dept. of Botany. G. E. Fogg. Plant and Soil, Special Volume, p 393-401, 1971. 2

Descriptors: *Nitrogen fixation, Descriptors: "Nitrogen fixation, "Lakes, Cyanophyta, Light intensity, Eutrophication, Phytoplankton, Productivity, Anabaena, Am-monia, Nitrates, Limiting factors, Nitrogen, Plankton, Depth, Algae. Identifiers: "Windermere (England), Heterocysts,

Benthic blue-green algae.

For valid estimate of total nitrogen fixed in a lake in a year, determinations should be made with representative samples to take account of horizontal and vertical variations in density of horizontal and vertical variations in density or blue-green planktonic algae at frequent intervals when the algae are abundant. Determinations in open waters using N-15 tracers show that nitrogen fixation is generally associated with presence of heterocystous blue-green algae and is light depen-dent. Fixation itself is not necessarily inhibited by dent. Fixation itself is not necessarily inhibited by presence of nitrate or ammonia in the water, although nitrogen-fixing blue-green algae tend to be abundant when these sources of combined nitrogen are low. Activity of these algae shows a direct relationship to dissolved organic nitrogen. concentration. Nitrogen fixation per unit area of lake surface per year tends to be greatest at an early eutrophication stage. Contribution of biological nitrogen fixation in relation to the total nitrogen budget of a lake is probably always small, may contribute a major part of the nitrogen assimilated by phytoplankton. Nitrogen fixation may frequently be important in eutrophic lakes in enabling higher production rates than would otherwise be possible. (Jones-Wisconsin) but at certain times and in particular water strata it

ALGAL NITROGEN FIXATION IN THE TROP-

RCS, Seijo Univ., Tokyo (Japan). Biological Lab. A. Watanabe, and Y. Yamamota. Plant and Soil, Special Volume, p 403-413, 1971. 2

Descriptors: *Algae, *Nitrogen fixation, *Tropical regions, Rice, Cyanophyta, Fertilization, Temperature, Crop production, Fungi, Soils, Symbiosis, Africa, Asia, Anabaena. Identifiers: *Green manure, India, Japan, Rice

Some recent data obtained on nitrogen fixation in rice fields, in tropical waters, and in symbiotic blue-green algae are summarized. Nitrogen-fixing blue-green algae seem to grow most abundantly in tropical and subtropical regions and to a lesser ex-

tent in temperate and sub-temperate regions. Of blue-green algae tested for nitrogen-fixing capaci-ty, Tolypothrix tenuis was the most efficient. The use of Tolypothrix tenuis as a source of green manure in agricultural practice was tested during 1951-1956 on about 40 rice fields in various parts 1951-1956 on about 40 rice fields in various parts of Japan. Over-all production shows an average increase in rice yields every year. Certain species of blue-green algae can withstand extreme environmental conditions such as high temperature and salinity. Those fixing nitrogen contribute to the nitrogen fertility of the seas and lakes. In Japanese hot springs, 320 species of blue-green were found 10 of which fixed nitrogen. Certain blue-green algae species form associations with other organisms such as fungi, liverworts, ferns, and seed plants. The relationship between these two organisms is sometimes commensal and other times symbiotic. Certain symbiotic blue-green algae are symbiotic. Certain symbiotic blue-green algae are provided with the ability to fix the atmospheric nitrogen. (Jones-Wisconsin) W73-02473

A REGULATORY MECHANISM FOR CO2 AS-SIMILATION IN PLANT PHOTOSYNTHESIS:
ACTIVATION OF RIBULOSE-1.-ACTIVATION OF RIBULOSE-1,-5-DIPHOSPHATE CARBOXYLASE BY FRUC-FRUCTOSE 1,6-DIPHOSPHATE, California Univ., Berkeley. Dept. of Cell Physiolo-

B. B. Buchanan, and P. Schurmann.

Federation of European Biochemical Sciences Letters, Vol 23, No 2, p 157-159, 1972, 4 fig. 11 ref.

Descriptors: *Carbon dioxide, *Photosynthesis, *Activation energy, Regulation, Plant physiology, Enzymes, Biochemistry, Bicarbonates.

Identifiers: Fructose 6-phosphate, Fructose 1-6-

Carbon assimulation in photosynthesis has a low affinity for carbon dioxide of ribulose 1,5-diphosphate (RuDP) carboxylase in the initial carbon dioxide incorporation reaction. anism which increases affinity of RuDP carboxylase for carbon dioxide (supplied as bicarboxyase for carbon dischage (suppuse as ocar-bonate) in vitro and which may govern the enzyme activity in vivo is reported. Activity of homogene-ous preparations of the carboxylase was increased up to 4-fold by 1mM fructose 6-phosphate (FGP). F6P-activated carboxylase was fully deactivated by addition of fructose 1,6-diphosphate (FDP). The activation by F6P (and deactivation by FDP) was independent of the enzyme concentration or RuDP and was observed at MgC12 concentrations ranging from 0.5 to 10 mM. Activation by F6P was markedly influenced by bicarbonate concentration. These results indicate that chloroplast RuDP that a physiological levels of carbon dioxide the enzyme activity may be controlled by the relative concentrations of F6P and FDP. F6P and FDP. concentrations of PoP and FDP. FoP and FDP levels may in turn be regulated by the ferredoxin-dependent FDPase system of chloroplasts that is actuated by light. A regulation mechanism for RuDP carboxylase, for which there is now evidence in chloroplasts, is summarized. (Jones-Wiscostein) Wisconsin) W73-02474

RELATION BETWEEN ANAEROBIC ATP SYNTHESIS FROM PYRUVATE AND FIXATION IN AZOTOBACTER NITROGEN VINELANDII, Agricultural Univ., Wageningen (Netherlands).

Dept. of Biochemistry.

H. Haaker, T. W. Bresters, and C. Veeger. Federation of European Biochemical Society Letters, Vol 23, No 2, p 160-162, 1972. 2 fig, 1 tab, 14

Descriptors: *Synthesis, *Nitrogen fixation, *Biochemistry, Azotobacter, Energy, Oxygen,

Identifiers: *Adenosine triphosphate, *Pyruvate, *Azotobacter vinelandii, Acetylene reduction.

How energy, necessary for nitrogen fixation (an anaerobic process) is provided, has not been answered. Anaerobic ATP synthesis from pyruvate in Azotobacter vinelandii and the significance of this process in nitrogen fixation are reported. The process of ATP synthesis from pyruvate is linear over at least a 30 minute period. The significance of substrate-bound phosphorylation process for the energy supply is illustrated. With pyruvate, under an atmospheric oxygen tension (p0-2 0.2), ATP is synthesized via the oxidative phosphorylation as well as by the substrate-bound phosphorylation. Without oxygen only the substrate-bound phosphorylation is observed. At low p0-2 (0.02) oxidative phosphorylation is lowered correspondingly, but the amount of substrate-bound phosphorylation is not changed. Clearly pyruvate can serve as an energy source under anaerobic conditions while an intermediate of the reaction from pyruvate to ATP and acetate, that is, acetyl phosphate, can provide ATP for nitrogen fixation. Thus pyruvate is the physiological energy donor for the anaerobic process of nitrogen fixation in Azotobacter. NADH formed during the PDC reactions can provide directly or indirectly via NADPH formed as the result of the pyridine nucleotide transhydrogenase reaction, reequivalents for the nitrogen fixing system. (Jones Wisconsin) W73-02475

THE NITRATE REDUCTASE OF CHLORELLA, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin (West Germany).

B. Vennesland, and L. P. Solomons

Plant Physiology, Vol 49, No 6, p 1029-1031, 1972. 1 fig. 12 ref.

Descriptors: *Nitrates, *Chlorella, *Biochemistry, Enzymes, Trace elements, Cultures, Laboratory

Identifiers: *Nitrate reductase, Chlorella fusca, Chlorella vulgaris.

Partial purification of a Chlorella NADH-nitrate oxidoreductase was recently described. The Chlorella used in this study is tentatively described as the Berlin strain. In order to compare previous work with the present, identical procedures compared the properties, in unfractionated extracts, of the nitrate reductase of Chlorella (Berlin strain), and of former Chlorella pyrenoidosa, now called Chlorella fusca var. vacuolata. Resulting data show that the properties of the nitrate reductases of the two strains are truly different in several respects. The procedures used for growing the cells, preparing the cell-free extracts, and assaying the nitrate reductase activity are outlined briefly. The several differences between the nitrate reductases obtained respectively from the two strains are so striking and so easy to demonstrate as to suggest that the properties of the nitrate reductase may serve as a further guide to classification of Chlorella. The nitrate reductase of fresh Chlorella fusca extracts usually showed no or only a small response to added FAD. Nitrate reductases possess diaphorase activity, and behave as pyridine nucleotide-cytochrome c reductases. In the nitrate reductase of the Berlin strain, the associated cyrochrome c reductase activity is fully active in fresh extracts. (Jones-Wisconsin)

THE EFFECT OF WATER LEVEL FLUCTUA-INE REPECT OF WATER LEVEL FLUCTUA-TIONS ON A LITTORAL FAUNA, Liverpool Univ. (England). Dept. of Zoology. P. C. Hunt, and J. W. Jones. Journal of Fish Biology, Vol 4, No 3, p 385-394, 1972. 1 fig, 2 tab, 19 ref.

Group 5C-Effects of Pollution

Descriptors: "Water level fluctuations, "Littoral, "Animal populations, Benthos, Profundal zone, Aquatic plants, Oligochaetes, Gastropods, Crustaceans, Reservoirs, Impoundments, Lake shores, Diptera. Identifiers: "Llyn Tegid (North Wales).

Littoral fauna of Llyn Tegid, North Wales, in 1968-69 are compared with that of earlier in-vestigations. Long term effects are shown due to restigations. Long term effects are shown due to mean water level change and increased water level fluctuations produced by the controlled outflow scheme started in 1955. Big reductions in numbers and variety of invertebrates in the littoral zone were recorded in 1961. Water fluctuations stranded many species and destroyed existing macrovegetation important as food, shelter, and egg depositories. All animal groups recorded before the 1955 impoundment were found in 1968-69 and most were fully reestablished. Change of the shoreline had a greater effect upon Oligochaetes than on any other class. Two leeches reappeared after complete loss in 1957 and 1959. The crustaceans, Gammarus pulex and Asellus meridianus, are perhaps the most sensitive invertebrates to increased water level fluctuations; their reestablishment is indicative of recent decreased water fluctuations. Gradual removal of silt by wave action and reestablishment of macrovegetation will result in the littoral environment returning tion will result in the littoral environment returning to its original physical status, provided water level fluctuations are not increased. The fauna will adapt to changes and revert to its original composi-tion which may take years. (Jones-Wisconsin) W73-02477

ROLE OF PHOSPHORUS IN EUTROPHICA-TION AND DIFFUSE SOURCE CONTROL, Wisconsin Univ., Madison. Water Chemistry Pro-

(Preprint) In: Conference on Phosphorus in Fresh Water and Marine Environment, April 1972, International Association on Water Pollution Research, London (England). 28 p, 1 tab, 22 ref.

*Water Descriptors: pollution *Phosphorus, *Eutrophication, Chemical analysis, Ynosphorus, Europincation, Chemicai analysis, Water pollution sources, Bioassay, Algae, Domestic wastes, Nutrients, Sediments, Analytical techniques, Fertilization, Aquatic plants, Nitrogen, Nutrient removal, Water treatment, Assay, Bacteria. Identifiers: Algal assay, Orthophosphate, Phosphorus sources.

What is needed to develop the most meaningful control program for excessive fertilization of natural waters is a method of assessing the role of phosphorus in eutrophication of a particular lake. The current technology with respect to the tests used is reviewed: bioassay of nutrient status, determination of critical nutrient concentrations; determination of critical nutrient concentrations; factors influencing exchange of nutrients between sediments and water; methods of phosphorus control. At this time there is insufficient evidence to predict quantitatively the role of phosphorus in excessive fertilization of a given lake, thus research is needed to assess this with various chemical and cessive fertuinzation of a given lance, into research is needed to assess this with various chemical and biological techniques. Emphasis should be placed on determining phosphorus sources, forms, rates of transformation, and availability for aquatic plant growth in natural waters. Results should be formulated in mathematical models enabling predictions of relationships between phosphorus input and excessive growths of aquatic plants. Efforts should be increased to control phosphorus from diffuse sources such as urban storm water and agricultural runoff. Detergents without phosphorus, properly evaluated with respect to potential environmental impact and personal safety hazards, should be formulated. Direct lake water treatment with phosphorus-precipitating chemicals should be studied on a large scale. (Jones-Wisconsin) WAYS IN WHICH A RESIDENT OF THE MADISON LAKES WATERSHED MAY HELP TO IMPROVE WATER QUALITY IN THE LAKES, Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.

G. F. Lee. July 1972. 10 p.

Descriptors: *Eutrophication, *Social participa-tion, *Water pollution control, Wisconsin, Lakes, Urban runoff, Agricultural runoff, Farm wastes, Algae, Aquatic weeds, Fertilization, Leaves, Legislation, Land use, Shores, Monitoring, Marshes, Soil erosion, Waste water treatment. Identifiers: *Madison (Wis), Lake Mendota (Wis), Lawn maintenance. I awn maintenance.

Methods are recommended by which Madison residents may prevent nutrients from entering the city's lakes, thereby reducing frequency and severity of excessive algal and weed growth. A centralized regulatory governmental unit should be developed with responsibility for water quality control in the county. Briefly recommendations are: fertilizer application by homeowners should not exceed the minimum needed for a healthy laws gross climpings leaves get a should be lawn; grass clippings, leaves, etc., should be worked into soil or placed in impervious con-tainers for collection; domestic and rural irrigation tainers for collection; domestic and rural irrigation runoff should be prevented; funds should be appropriated for more frequent street sweeping; dairy farmers, livestock owners, and feedlot operators should not spread manure on frozen ground; close scrutiny should ascertain if any fertilizing processes tend to increase phosphorus runoff; ordinances should be adopted for penalty assessment; all new urban developments should be required to use the latest techniques to minimize phosphorus transport; funds should be required to use the latest techniques to minimize phosphorus transport; funds should be appropriated for enforcement of the ordinance prohibiting discharge to storm sewers of cooling tower blowdown water; shoreline debris should be collected; funds for long-term monitoring programs should be appropriated; marsh drainage should be prohibited; soil erosion prevented; excessive growths of aquatic weeds harvested. (Jones-Wisconsin) W73-02479

THE EFFECT OF ECOLOGICAL CONDITIONS ON THE PARASITE FAUNA OF PERCH PERCA FLUVIATILIS L. IN LAKE DARGIN, Wyzsza Szkola Rolnicza, Szczecin (Poland).

R. WIETZDICKI. Ekol Pol. Vol 19, No 5, p 73-86. 1971. Illus. Map. Identifiers: Ecological conditions, Fauna, *Lake Dargin, *Parasite fauna, Perca-Fluviatilis, *Perch, *Poland.

Investigations of P. fluviatilis L. from various parts of Lake Dargin showed a zonal variation of the parasite fauna of this species. Each lake zone had its characteristic dominant species, which was closely related with ecological conditions. Among parasites, a seasonal infection was observed.— Copyright 1972, Biological Abstracts, Inc. W73-02500

SALINITY-RELATED POLYMORPHISM IN THE BRACKISH-WATER DIATOM CYCLOTELLA CRYPTICA, Connecticut University, Storrs. Biological

Sciences Group.

Canadian Journal of Botany, Vol 49, No 8, p 1285-1289, 1971. 1 fig. 1 tab, 9 ref. OWRR A-014-CONN (5). 14-01-0001-901.

Descriptors: *Diatoms, *Salinity, *Bioindicators, Brackish water, Freshwater, *Algae, Water pollu-

Identifiers: *Cyclotella cryptica, *Cyclotella meneghiniana, *Polymorphism, *Valve morphology, *Valve pattern characteristics, Clones.

The brackish-water diatom Cyclotella cryptica is a polymorphic species. Nine clones are capable of producing the valve pattern characteristic of the species C. meneghiniana, as well as the C. cryptica pattern. A study of the effects of salinity and freshwater conditions on the morphology of the valve shows that the cryptica pattern is produced in salinities of about 4.3% to full-strength seawater, 28.7%. The 'meneghiniana' pattern is the freshwater or low salinity (1.4%) form. Characteristics of the valve morphology and life history stages which distinguish C. cryptica from C. meneghiniana and Cyclotella sp., clone 03A, are presented and discussed. presented a W73-02548

TAXONOMY OF NORTH SHORE PERIPHYTON, LAKE SUPERIOR, CASTLE DANGER STUDIES 1976-1971, Minneapolis. School of Public

Health. R. R. Nelson, T. A. Olson, and T. O. Odlaug. Limresta, Lake Superior Limnological Research Station, Duluth, Minn., Research Report No 1, p 31-36, June 1971. 14 ref. OWRR B-020-Minn (1). 14-31-0001-3095

Descriptors: *Periphyton, *Lake Superior, *Minnesota, Water pollution effects, Systematics, Phosphates, Nitrates, Aquatic life, Water pollution effects, Aquatic populations. Identifiers: *Periphyton populations, *Artificially denuded area, Test pool, Periphyton mass, *Castle Danger (Minn).

Two natural rock basins were constructed at the Two natural rock basins were constructed at the Lake Superior lakeside near Castle Danger and Duluth, Minnesota for the purpose of exposing naturally grown periphyton to various concentra-tions of enriching substances; namely, phosphates and nitrates. These gabbro rock basins, situated in a clean area along the north shore, received con-stant flow of fresh water and were exposed to the same insolation and general climatic conditions as the lake itself. One pool served as a normal lake-water control whereas the other was the test normal water water. water control, whereas the other was the test pool, into which nutrients were added. A detailed taxonomic identification of the organisms constituting the periphyton was undertaken. This identification work was carried out on the periphyton in both pools as well as in Lake Superior itself. A checklist to indicate the nature of the species makeup of the periphyton along Minnesota's North Shore is provided. (Walton-Minnesota) W73-02555

POLLUTION AND THE ECOLOGY OF NEARSHORE PERIPHYTON OF LAKE SU-PERIOR: THE EFFECTS OF CALEFACTION ON PERIPHYTON, Minnesota Univ., Minneapolis. School of Public

Drown, 1. A. Olson, and T. O. Odlaug. In: Lake Superior Limnological Research Station, Limnests, Research Report No 3, April 1972. 6 p, 1 fig. 2 ref. OWRR B-020-MINN (2). 14-31-0001-3095.

Descriptors: Water pollution effects, *Periphyton, Thermal pollution, *Lake Superior, *Minnesota, Ecosystems, Chlorophyll, Biomass, Nutrients, Ecology, Pollutant identification, Thermal stratifi-

Identifiers: *Seed Rocks, *Dry Weight Biomass, *Ash-free Biomass, *Castle Danger (Minn).

Since the periphyton of Lake Superior contributes Since the periphyton of Lake Superior contributes significantly to the nearshore primary productivity of the lake, this segment of the lake ecosystem was selected for a study of the possible local effects of heated discharges from power plants. During the summer of 1971, four 330 gallon stock tanks were installed on the lake shore near Castle Danger, Minnesota. Three of the tanks were designed to provide good circulation of water and

to prevent laden rock reservoir a rocks some water, we periphyton that a mar tank. The preduced. (W73-02556

INTERACT GROWTH COMPOSI Skidaway l For primar W73-02572

COMPAR OF FREE GOZERSK WHITE SE Zoology. I. V. Burko Zool Zh. V (English su Identifiers Migration,

The compo habitats (w gravel, alg tous algae fauna of b those of waleast relate zones and are consid ciliates are Abstracts, W73-02585

NOTE OF CHIRONO SUWA, (II Shinshu U For primar W73-02586

INTRODU CAL REL MENTS O O. Gonet. Bull Soc 156. 1971. Identifiers ments, *Sy

the highly bottom of ment are eutrophica Biological W73-02592

WEEKLY PHYTOPI LAKE B EUTROPE Magyar Try). Biolog J. Olah.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Waste Treatment Processes—Group 5D

to prevent stagnation or temperature stratification to prevent stagmatum or temperature stratucation of water in the tanks which contained periphyton-laden rocks. The fourth tank was used as a heat reservoir and was seeded with periphyton-laden rocks some of which were denuded for a regrowth rocks some of waich were denuded for a regrowth study. To ascertain changes caused by the heated water, weekly analyses were made of the periphyton. Preliminary observations indicated that a marked change took place in the heated tank. The periphyton on the seed rocks was greatly reduced. (Walton-Minnesota) W73-02556

INTERACTIONS OF FEEDING RATES AND EN-VIRONMENTAL TEMPERATURE ON GROWTH, FOOD CONVERSION, AND BODY COMPOSITION OF CHANNEL CATFISH, Skidaway Inst. of Oceanography, Savannah, Ga. For primary bibliographic entry see Field 081. W73-02572

COMPARATIVE STUDY OF THE ECOLOGY OF FREE-LIVING CILIATES IN THE RU-GOZERSKY INLET (KANDALAKSHA BAY, WHITE SEA), Moscow State Univ. (USSR). Dept of Invertebrate

Zoology. I. V. Burkovskii

Zool Zh. Vol 50, No 12, p 1773-1779, 1971. Illus.

(English summary).

Identifiers: "Algae, Bays, "Ciliates, Comparative studies, Ecology, Inlets, "Kandalaksha Bay, Migration, Rugozersky Inlet, Sea, USSR, "White

The composition of fauna was studies in different habitats (water, thallus of laminarian algae, sand, gravel, algal waste, algal ooze, masses of filamentous algae). Ninety-seven spp. of ciliates were found (among them 19 new for the White Sea). The fauna of benthic habitats were most related and fauna of benthic habitats were most related and those of water and thallus of laminarian algae were least related. Three equally separated ciliate as-sociations were distinguished: pelagic, benthic zones and epifauna. Relationships between them are considered. Some possible migration habits of ciliates are discussed.—Copyright 1972, Biological Abstracts, Inc. W73-02585

NOTE ON THE SWIMMING BEHAVIOR OF CHIRONOMUS PLUMOSUS LARVAE IN LAKE SUWA, (IN JAPANESE), Shinshu Univ., Matsumoto (Japan). For primary bibliographic entry see Field 02H. W73-02586

INTRODUCTION TO STUDY OF THE CHEMI-CAL RELATIONSHIPS BETWEEN THE SEDI-MENTS ON THE BOTTOM AND THE WATER OF THE LAKE OF GENEVA,

Bull Soc Vaudoise Sci Nat. Vol 71, No 3, p 131-156. 1971. Illus. English summary.
Identifiers: *Eutrophication, *Lake Geneva, Sediments, *Switzerland, *Lake sediments.

The chemical reactions which take place between The chemical reactions which take place between the highly unstable sediments deposited on the bottom of Lake Geneva and the water environment are partly responsible for the more rapid eutrophication of the lake.—Copyright 1972, Biological Abstracts, Inc. W73-02592

WEEKLY CHANGES OF THE BACTERIO- AND PHYTOPLANKTON STANDING STOCK IN LAKE BALATON AND IN THE HIGHLY EUTROPHIC LAKE BELSO, Magyar Tudomanyos Akademia, Tihany (Hunga-ry). Biological Research Inst. J. Olah.

Ann Inst Biol (Tihany) Hung Acad Sci. 38: p 167-Alm installed in the state of t

Seasonal abundance, standing stocks and biomass of phytoplankton and photosynthetic bacteria in Lake Belso and Lake Balaton, Hungary are discussed .-- Copyright 1972, Biological Abstracts, W73-02594

COMPARATIVE INVESTIGATIONS ON THE ENTRIC FAUNA AT TWO SEWAGE IN-FLOWS OF LAKE BALATON, Magyar Tudomanyos Akademia, Tihany (Hunga-ry), Biological Research Inst. J. E. Ponyi, J. Olah, P. Biro, and K. Biro.

Ann Inst Biol (Tihany) Hung Acad Sci. 38: p 199-226. 1971. Illus. Maps.

Identifiers: *Benthic fauna, Comparative studies, Crustacea, *Eutrophication, *Hungary, Lakes, *Sewage inflows, *Lake Balaton (Hungary).

The data obtained show definite quantitative and The data obtained show definite quantitative and qualitative difference in the composition of species found at 3 collecting sites. These differences may be connected with the quantitative distribution of the detritus and the propagation of detritophagous organisms. The phenomenom was especially striking in the case of heterogenous Crustacea. The degree of eutrophication was different on 3 collecting sites. On the basis of the benthic fauna, the most advanced level of eutrophication was present at Balatonfured, followed by the inflow area of the sewage-inflow of cutropincation was present at Balatomured, toi-lowed by the inflow area of the sewage-inflow of Tihany. The lowest degree of eutrophication was observed in front of the Biological Research In-stitute.—Copyright 1972, Biological Abstracts, Inc. W73-02595

QUANTITATIVE DESCRIPTION OF THE INI-QUANTITATIVE DESCRIPTION OF THE INI-TIAL LINES OF THE PRODUCTION PROCESS IN THE SHALLOW-WATER BAYS OF THE POSIET BAU (JAPANSES SEA), (IN RUSSIAN), Akademiya Nauk SSSR, Vladivostok. Institut Morskogo Biologii.

T. S. Karapetyan

Okeanologiya. Vol 11, No 4, p 700-704. 1971. Illus.

English summary. Identifiers: *Bacteria, Bays, Diatoms, *Japanese Sea, Links, *Phytoplankton, *Posiet-Bau, Shallow water bays.

Planktonic communities were studied in shallowwater bays of Posiet Bau in the summer and au-tumn of 1968. The productivity of bacterioplanktumin of 1966. The productive of the average bacteria production was 62 /micro g of C/l/day in autumn. Phytoplankton photosynthesis had the maximum may 10 /micro g of C/l/day in autumn. value of 34 /micro g of C/l/day in summer and became as low as 5 /micro g of C/l/day in autumn. The bulk of production is attributed to the distorms. diatoms. Bacteria and phytoplankton production decreased towards the sea. The experiments show that natural bacterioplankton is actively eaten by zooplankton. A correlation was found between zooplankton numbers and bacterioplankton-production levels.--Copyright 1972, Biological Ab-

5D. Waste Treatment Processes

APPLICATIONS OF AGGLOMERATE TEST-ING TO PROBLEMS IN WATER RESOURCES MANAGEMENT,

Wisconsin Univ., Madison. Water Resources Center.

For primary bibliographic entry see Field 05F. W73-01965

CONSTRUCTION OF WASTEWATER FACILI-TIES, AUSTIN, TEXAS (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Environmental Protection Agency, Dallas, Tex. Region VI.

Available from the National Technical Informa-tion Service as EIS-TX-72-4580-F, \$14.75 in paper copy, \$0.95 in microfiche. May 26, 1972. 239 p, 14 fig, 4 map, 1 photo, 8 tab, 2 append.

Descriptors: "Texas, "Environmental effects, "Waste water treatment, "Tunnel construction, Excavation, Tunnels, Underground structures, Environmental sanitation, Municipal wastes, In-Environmental santation, Municipal wastes, Industrial wastes, Waste treatment, Waste water (Pollution), Waste water disposal, Sewage disposal, Vegetation, Channel improvement, Wildlife habitats, Chlorine.

Identifiers: *Environmental Impact Statements, *Austin (Tex)

This project involves the construction of a deep tunnel interceptor and the enlargement of an exist-ing wastewater treatment plant in Austin, Texas. ing wastewater treatment plant in Austin, Texas. The tunnel will intercept wastewater flows from existing and proposed interceptro flows and convey them to the proposed wastewater treatment plant. The project will have a significant beneficial effect on the water quality of Lake Austin, Town Lake, and the Colorado River and the surrounding area. Adverse effects of the project include: the discharge of wastewater into Walnut Creek; loss of vegetation and wildlife habitat due to modifications to Walnut Creek channel; an increase in combinations of combined chlorine in Walnut Creek and, to a lesser extent, in the Colorado River; adverse aesthetic appeal which follows construction verse aesthetic appeal which follows construction of a permanent wastewater treatment plant; and temporary noise and inconvenience attending the tunnel construction. Alternatives considered involved plant location, interceptor location, treat-ment process, and sludge disposal. Comments from various agencies are included. (Ellis-Florida)

(SANTA ROSA, SONOMA COUNTY, CALIFORNIA, SEWER COLLECTION AND WATER DISTRIBUTION SYSTEM), (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Economic Development Administration, Washington, D.C.

For primary bibliographic entry see Field 03D. W73-01996

PROBLEMS IN THE UTILIZATION AND CON-SERVATION OF WATER RESOURCES (PROBLEMY ISPOL'ZOVANIYA I OKHRANY

VODNYKH RESURSOV).
Belorusskii Nauchno-Issledovatelskii Institut
Melioratsii i Vodnogo Khozyaistva, Minsk Melioratsii i For primary bibliographic entry see Field 04A. W73-02061

REUSE OF SURFACE RUNOFF FROM FUR-ROW IRRIGATION,
Oklahoma State Univ., Stillwater. Dept. of
Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W73-02118

EFFECTS OF LONG CHAIN POLYMERS ON THE SIZE DISTRIBUTION OF OIL-IN-WATER EMULSIONS, Brown Univ., Providence, R.I. Div. of Engineer-For primary bibliographic entry see Field 05G. W73-02120

ON THE USE OF RECLAIMED WASTE-WATERS AS A PUBLIC WATER-SUPPLY SOURCE American Water Works Association, New York.

Group 5D—Waste Treatment Processes

For primary bibliographic entry see Field 03C. W73-02141

COMMUNITY WATER POLLUTION R AND D

NEEDS.
American Water Works Association, New York.
Committee on Pollution Parameters.
For primary bibliographic entry see Field 05G.
W73-02148

MAGNESIUM CARBONATE: A RECYCLED COAGULANT - II, Thompson and Tuggle, Montgomery, Ala.

For primary bibliographic entry see Field 05F. W73-02145

HIGH RATE FILTRATION IN FAIRFAX COUN-TY, VIRGINIA, Fairfax County Water Authority, Annandale, Va. For primary bibliographic entry see Field 05F. W73-02146

POLYETHYLENE PIPE USED FOR 36-IN SEWAGE OUTFALL.

Civil Engineering-American Society of Civil Engineers, Vol 42, No 10, p 58-60, October 1972, 4 fig.

Descriptors: *Waste treatment, *Plastic pipes, *Outlets, *Outfall sewers, Cost analysis, *Vir-

ginia, Sewage, Sewers. Identifiers: *Sewage outfall pipe, *Williamsburg (Virginia).

A 3800 ft. high-density polyethylene outfall line was recently installed near Williamsburg, Virginia, was recently installed near Williamsburg, Virginia, as part of a new sewage treatment system. The original choice of concrete pipe was abandoned when test boring indicated that the river bottom was composed of sediments with poor bearing capacity and stability. The 3-6-in. polyethylene pipe was selected because of its flexibility and because of its light weight which permitted minimal bottom support. The use of the polyethylene outfall resulted in a considerable savings of both time and money. (Murphy, Tevas) money. (Murphy-Texas) W73-02188

GREAT LAKES ADDS NEW WOODROOM AND FLUID BED REACTOR,

A. W. J. Dyck. American Paper Industry, Vol 54, No 10, p 32-35, October 1972, 5 fig.

Descriptors: *Water reuse, *Waste treatment, *Water conservation, Water pollution, Air pollution, *Pulp and paper industry, Industrial wastes, Solid wastes, Industrial water, Incineration, Disposal.

The Great Lakes Paper Company has added a new KMW woodroom and a Copeland fluid bed solid waste incinerator to its mill at Thunder Bay, Ontario. The woodroom has increased fiber yield by 3.5 percent by using a new cutoff saw system of slashing after barking and aligning. Also, water consumption was reduced by 90 percent as a result of a de-icing procedure followed by dry debarking. The Copeland fluid bed incinerator is helping to clean up many years accumulation of solid waste clean up many years accumulation of solid waste. clean up many years accumulation of solid waste without creating new pollution problems since it functions without odor or particulate fallout. In addition the Copeland incinerator generates hot water for the de-icing system. (Murphy-Texas)

WATER AND SEWAGE SLUDGE ABSORPTION

BY SOLID WASTE, Stone (Ralph) and Co., Inc., Los Angeles, Calif. R. Stone, and R. L. Kahle.

Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol 98, No SA 5, p 731-743, October 1972. 7 fig, 4 tab.

Descriptors: "Waste treatment, "Sludge disposal, "Absorption, Rates, Landfills, Leachate, Solid wastes, Wood wastes, Waste disposal. Identifiers: Absorptive capacity.

Using solid waste landfills as disposal sites for sewage sludge requires that the liquid sludge be absorbed with minimal runoff and leaching. Laboratory bench scale tests of the absorptive rates for the various components of solid waste were conducted for such items as paper, grass and woody shrubs, food waste, cloth and wood. Absorption rates generally followed a simple exponential time function. Laboratory results were corroborated by a pilot test using sewage and waste of composition samples in Oceanside, California. The average saturation value was 134 pounds of liquid sludge per 100 pounds of solid waste. This value was near the upper limit of prediction due to the effects of liquid entrainment in the voids between solids. Results indicate that the expected absorptive capacity of waste of a known Using solid waste landfills as disposal sites for expected absorptive capacity of waste of a known composition can be estimated from the absorptive capacity of each component. (Murphy-Texas) W73-0219

ONEIDA SHOWS THE WAY TO GO.

Water and Sawyer, New York.
W. B. Sinnott, and A. E. Schuler.
Water and Wastes Engineering, Vol 9, No 8, p 2831, August 1972. 2 tab.

Descriptors: *Sewage treatment, Cost analysis, *Interceptor sewers, Sludge treatment, Chlorine, *Waste water treatment, *New York, *Sewers, *Regional development, *Water pollution control. Identifiers: *Oneida County (N.Y.), Forced mains.

Twelve communities are now served by the Oncida County Sewer District, one of the newest regional wastewater treatment systems. The construction of 30 miles of intercepting sewers and forced mains was phased to coincide with plant construction. Two pumping substations were also required. All pumps were of the stepless variable speed type. The plant, designed for 27 mgd expandable to 40 mgd in the future, can handle high flows of 2.5 times the average. Complete secondarry treatment was the design goal. Centrifugally dewatered sludge is oxidized in an oil sustained flume. Chlorine facilities are designed for ton containers hauled by rail or truck. Controlling this plant is made easy by a central graphic control panel, indicating and recording all operating information. Consultants, contractors and suppliers are tabulated for quick reference as well as the design criteria for the unit operations and the community criteria for the unit operations and the design the community by community breakdown of initial annual service charge. (Anderson-Texas)

VIENNA-BLUMENTAL SEWAGE TREATMENT PLANT, W. van der Emde.

Reprint from Osterreichische Wasserwirtschaft, January/February 1971. 8 p, 11 fig, 1 tab.

Descriptors: "Activated sludge, "Aeration, "Waste water treatment, "Sludge digestion, Treat-ment facilities, Sewage treatment. Identifiers: "Vienna, "Austria.

The new Blumental peak-load treatment plant, handling about 10% of the wastes from the city of Vienna, was built as a complete activated sludge treatment plant except for sludge disposal facilities, sludge being put back into the sewer to the central treatment plant. The aeration tanks use Mammoth Rotors with variable speed and depth for aeration. Extensive power to aeration calibrafor aeration. Extensive power to aeration calibra-tion revealed that the manufacturer's guarantee was exceeded. The two aeration tanks can be operated in four ways: (1) activated sludge in series, (2) contact stabilization, (3) one tank as an aerator and the other as a sludge digestor (this is feasible only as long as population remains below the design level) and (4) only one aerator at a time, for repair shutdowns. The clarifiers are large enough to allow operation with only one clarifier in service. An extensive scum blanket proved to be a muisance, expecially during severe frost. The use in service. An extensive scam blanket proved to be a nuisance, especially during severe frost. The use of two aeration tanks without primary settling and sludge digestion with the possibility of digestion in one aeration tank is useful for wastes with large portions of industrial wastes, large seasonal fluctuation, or poorly defined growth expectations. (Anderson-Texas)

REGENERATION OF STEELWORKS HYDROCHLORIC ACID PICKLE LIQUOR, Steel Co. of Canada Ltd., Hamilton (Ontario). STEELWORKS Utilities Dept. A. C. Elliott.

Effluent and Water Treatment Journal, Vol 10, No 7, p 385-390, July 1970, 1 tab.

Descriptors: *Industrial wastes, Iron oxide, *Waste water treatment, Treatment facilities, *Canada, *Steel, Water reuse.
Identifiers: *Iron picking.

As a result of pickling of iron - a process of cleaning the surfaces of sheet steel during galvanizing or timing of sheet steel, pickle liquor containing 12-13% by weight of free HCl and 9-11% by weight of FeCl2 becomes a source of pollution. In order to solve this problem, the regeneration plant at the Hilton Works of the Steel Company of Canada was designed. In the process, the acid content of the pickle liquor is reclaimed for further use and iron axide is produced as a by-product. Iron oxide the pickle liquor is reclaimed for further use and iron oxide is produced as a by-product. Iron oxide produced at the regeneration plant is 97% pure and hence a number of methods could be employed to convert it into iron powder. The production of iron obviously could be quite profitable. The regeneration plant is basically a simple process, but due to production changes or breakdowns, running the unit can be critical. (Morparia-Texas) W73-02198

WASTEWATER TREATMENT BY ION EXCHANGE, University Coll., London (England). Dept. of Civil

and Municipal Engineering.

J. Gregory, and R. V. Dhond.

Water Research, Vol 6, No 6, p 681-694. June 1972. 6 fig. 5 tab, 9 ref.

Descriptors: *Anion exchange, *Phosphates, *Nitrates, *Waste water treatment, Resins, Or-ganic matter, *Ion exchange, Sewage treatment. Identifiers: *Exchange resins.

Nine commercially available strong base anion exchange resins were used in preliminary laboratory trials on the secondary sewage effluent out of which three resins, FF-IP, IRA 910 and N-IP, were selected for detailed investigation with respect to their applicability in removal of nitrates, phosphates and color. The column, specifically evolved for the experiments, consisted of a perspex tube, 1 m. long and 5 cm inside diameter, fitted with the conical end pieces to allow uniform flow distribution. The bottom cone was fitted with stainless steel mesh which acted as a support for the ion exchange resins. After having detailed the description of the experiments with respect to ion exchange column, preparation of resins, secondaexchange column, preparation of resins, seconda-ry effluent used, column operations, regeneration of resins, conditioning of resins and the schedule of experiments, the results have been displayed graphically or tabulated and then analyzed. In spite of reductions in dissolved organic matter, phosphates and nitrates, for various other reasons, it has been concluded that large scale and

widespread a ment of efflicases. (Morp W73-02202

PRACTICAL POLYELECT Sunderland tario). R. W. Hunter Water Treats

Descriptors: ment, *Activ Polyelectroly Identifiers: *6

p 182-192, 197

Polyelectroly silica as coag 'Mud line te use of starch rates from 0 ble. Contents higher unflow avoidance of higher upflow was also obs that summer ferent blanke performance. between blan seasons show winter condit fluctuations i Methods of in ditioning tank trolytes and evaluated usi By suitable a concentration Again the sav mide far exce capital works aids has prov the increased W73-02203

FLOW ULTR TO, J. Schrantz. Industrial Fin tember 1972.

Descriptors: reuse, Industr Identifiers:

The increasi technology of finishing is dis the closed-loo gallon EDP ta linois. 40 UF ter and 3 ft. 1 meate 9 gallor EDP bath. 14 weight polymout resins and trolytes, and preceded by microns in or tridges. The p 1.5-3 gpm ad water and with lection pan is parts in three drag-out paint first rinsing at hence is direct resins and pig to the EDP ta 30% have be 30% have be widespread applications of anion exchange treat-ment of effluents are unlikely unless in extreme cases. (Morparia-Texas) W73-02202

PRACTICAL EXPERIENCE IN THE USE OF

POLYELECTROLYTES, Sunderland and South Shields Water Co. (Ontario). R. W. Hunter.

Water Treatment and Examination, Vol 20, No 3, p 182-192, 1971. 2 fig. 1 tab, 1 ref.

Descriptors: *Sedimentation, *Waste water treat-ment, *Activated sludge, *Filtration, Polymers, ment, *Activateu Polyelectrolytes. Identifiers: *Coagulant aids.

Polyelectrolytes have been replaced for activated silica as coagulants. Laboratory experiments using 'Mud line technique' found a linear relationship between starch dose and sludge-settling rate. The use of starch as coagulant, increased the upflow rates from 0.4 mm/sec to 0.6 mm/sec and the avoidance of the use of 12 extra tanks was possi-ble. Contents of solids in the sludge is critical at higher upflow rates to maintain blanket levels. It was also observed from seasonal water analysis
that summer and winter conditions required different blanket concentration to maintain the same
performance. Also observing the relationship
between blanket density and upflow rates for two seasons showed more pronounced scatter winter conditions, the reason being attributed to fluctuations in turbidity because of winter rains. Methods of improving performance of sludge con-ditioning tanks by secondary addition of polyelec-trolytes and other materials such as lime were trolytes and other materials such as lime were evaluated using 'capillary suction time method'. By suitable additions of polyacrylamides, sludge concentrations of 3.0% were readily achieved. Again the savings made by the use of polyacrylamide far exceed the costs of otherwise necessary capital works. The use of polymers as coagulant aids has proved to be an attractive alternative to the increased capital expenditure. (Morparia-Tex-W73.02203

FLOW ULTRAFILTRATION BENEFITS EQUIP-

Industrial Finishing, Vol 48, No 9, p 28-32, September 1972. 2 fig.

Descriptors: *Waste water treatment, Water reuse, Industrial wastes.
Identifiers: *Ultrafiltration, *Electrodeposition

The increasing role of ultrafiltration in the technology of Electrodeposition Process (EDP) finishing is discussed with a specific description of the closed-loop ultrafiltration process on an 18,000 gallon EDP tank installed in Equipto at Aurora, Illinois, 40 UF cylindrical cartridges of 5 in. diameters 42 UF cylindrical cartridges of 5 in. diameters 42 UF cylindrical cartridges of 5 in. diameters 43 UF cylindrical cartridges of 5 in. diameters 45 UF cylindrical cartridges of 5 in. linois. 40 UF cylindrical cartridges of 5 in. diameter and 3 ft. long, each working in parallel, permeate 9 gallons of rinse water per minute from the EDP bath. 14 ft. sq. membranes of high molecular weight polymer of 50-200 angstrom porosity filter out resins and pigments from water, some electrolytes, and solvents. These cartridges are preceded by 180 conventional filters rated at 25 microns in order to increase the life of UF cartidges. The represet described above along with tridges. The permeate described above along with 1.5-3 gpm addition of deionized make-up rinse water and with a similar mixture from a rinse colwater and with a similar mixture from a raise col-lection pain is recycled to rinse the electropainted parts in three stages, in order to recover as much drag-out paint as possible. The drag-out from the first rinsing stage contains most of the paint and hence is directly sent back to the EDP tank. The resins and pigments filtered out are also sent back to the EDP tank for reuse. Thus, paint savings of 30% have been reported as a result of 100%

reclaiming of drag-out. The elimination of drag-out going down the drain also prevents pollution. Due to the closed-loop nature of the process, savings of 45 ppm of rinse water have been achieved. (Morparia-Texas)
W73-02205

PHENOL SORPTION BY ACTIVATED CARBON AND SELECTED MACROPOROUS RESINS, California Univ., Berkeley.

Camorina Univ., Berkeley. J. S. Kumagai. Available from University Microfilms, Inc, Ann Arbor, Michigan, Order No 70-13,093 Xerox Copy \$6.60. Ph. D. Dissertation, 1969, 150 p.

Descriptors: *Sorption, *Phenols, Activated carbon, Waste treatment.
Identifiers: *Sorption energy, Styrene-DVB, Bioactivity, Hydrophobic bonding.

The objectives were: (1) to establish the relation between phenol sorption performance and resin composition, and (2) to compare the results to ac-tivated carbon in low phenol concentration systems. Two special cases were considered in aystems. Two special cases were considered in theory: (a) constant sorption energy with surface coverage for the Langmuir isotherm and (b) logarithmic variation of sorption energy with surface coverage for the Freundlich isotherm. Sorption energy was evaluated by the Clausius-Clapeyron equation at 25.0 C and 44.5 C. The occurrence of different isothern segments, the variation of sorption energy with surface coverage, the influence of pH, and the isotherms in methanol solvents, all indicated that the resin sorbents were betrozeneous and that sorption occurred with difheterogeneous and that sorption occurred with different resin components independently or in con-cert depending on phenol concentration. In this study, the following compositions were found to study, the following compositions were found to be effective in low concentration phenol sorption: (a) tertiary amine, (b) styrene DVB, and (c) polar groups in the acrylamide matrix. Sorption by terti-ary amine and polar groups in the acrylamide could be best described by hydrogen binding, and sorption by the styrene-DVB could be described by hydrophobic bonding. Evidence of phenol degradation in activated carbon systems indicated bioactivity to be the principal mechanism. (Ander-

A METHOD FOR ISOLATING SUSPENDED SOLIDS FROM SEWAGE EFFLUENTS FOR MEASUREMENT OF OXYGEN DEMAND,

Water Pollution Research Lab., Stevenage (En-

Water Research, Vol 6, No 9, p 1097-1100, September, 1972. 1 fig, 1 tab, 3 ref.

Descriptors: "Activated sludge, Biological treatment, "Waste water treatment, "Filtration, "Oxygen demand, Domestic sewage, "Suspended solids, Organic matter, Sewage treatment, Filters. Identifiers: Oxygen balance.

The uptake of oxygen by the effluents from biological sewage treatment or from activated sludge processes is due to the presence of suspended solids. Also, the organic matter dissolved in the effluent consumes oxygen by virtue solved in the effluent consumes oxygen by vitue of the presence of bacteria. In order to study their oxygen demand, a good method to isolate these suspended solids from the effluent discharge would be very useful. A rapid filtration method using filter aid has been devised and is described. The effluents from the laboratory's plants readily settled domestic sewage were filtered using three different filter aids and the method was found to different futer auss and the method was found to be valid for the measurements of oxygen demand for periods up to 24 hours. Further experiments also proved this method to be rapid for estimating the initial rate of oxygen demand. The results of the experiments are given in a table and a graph. This method could be used in studies of oxygen balance in rivers receiving biologically treated sewage effluents and also in developing improved methods of assessing the quality of such effluents. (Morparia-Texas) W73-02207

ANION EXCHANG. EQUILIBRIA INVOLVING PHOSPHATE, SULPHATE AND CHLORIDE, University Coll., London (England). Dept. of Civil onversity Coll., London (England). Dept. of Civil and Municipal Engineering.
J. Gregory, and R. V. Dhond.
Water Research, Vol 6, No 6, p 695-702, June 1972. 4 fig. 2 tab, 8 ref.

*Waste water Descriptors: treatment. *Phosphates, *Ion exchange, *Resins, exchange, *Chlorides, *Sulfates. Identifiers: *Exchange resins.

Ten different strongly basic anion exchange resins Ten different strongly basic anion exchange resins have been investigated and equilibrium data for phosphate-chloride, sulphate-chloride and phosphate-sulphate system have been collected. Their applicability in the removal of phosphate from wastewaters was evaluated. The effect of the sulphate ion, which is preferred over phosphate by all of the resins has been given special attention. Some systematic differences were found, which resears to be related to the type of functional group. on the resin. The results of the experiments are presented. (Morparia-Texas)

TREATMENT PLANT AT VIRGINIA MILL

Southern Pulp and Paper Manufacturer, Vol 33, No 4, p 65, April 1970. 2 fig.

Descriptors: "Pulp wastes, Water pollution con-trol, "Waste water treatment, "Treatment facili-ties, "Virginia, "Flotation.
Identifiers: Krofta Airfloat 36 flotation unit.

80% of the wood fibers that normally would be wasted by a conventional waste treatment process can be recovered in a reusable form by a water treatment plant installed in Owens-Illinois, Inc.'s Big Island, Virginia pulp and paper mill. This plant, for the first time in U. S. A., makes use of European designed Krofta Airfloat 36 flotation unit. The detailed operation of the Airfloat is described. Owens-Illinois began using this process in 1933 and it has made a major contribution to the reduction of chemical and organic pollution of waters. (Morparia-Texas) can be recovered in a reusable form by a water

ECONOMIC LIMIT FOR THE AMOUNT OF RESERVE CAPACITY ON CONSTRUCTION OF SEWAGE TREATMENT PLANTS FOR RAPIDLY GROWING MUNICIPALITIES, Hannover. Technische Universitaet, Hanover (West Germany). Institut fuer Siedlungswasserwirtscheft.

wirtschaft. C. F. Seyfried.

Water Research, Vol 6, No 6, p 331-333, June 1972. 1 ref.

Descriptors: *Cost analysis, *Treatment facilities, Economics, Mathematical studies, Cost comparisons, Estimating, Waste water treatment.

Since a sewage treatment plant is always planned for a period of 25-30 years, the decision whether it should be constructed immediately for the planned final capacity or in sections is very important from an economic point of view. A method for finding the time of cost equality for the cost class of complete construction and the cost class of concompiete construction and the cost cass of con-struction in two sections is derived. If the reserve is required before this time, it would be cheaper to complete it immediately. The treatment system also has an important influence on the decision and is incorporated in this method. (Morparia-Tex-

Group 5D—Waste Treatment Processes

W73-02211

SIMULATION OF THE MEAN PERFORMANCE OF MUNICIPAL WASTE TREATMENT Waterloo Univ., (Ontario). Dept. of Chemical En-

gineering. P. L. Silveston.

Water Research, Vol 6, No 9, p 1101-1111, September 1972. 4 fig, 5 tab, 9 ref.

Descriptors: *Waste water treatment, *Model stu-dies, *Sewage treatment, Activated sludge, *Treatment facilities, *Simulation analysis, Identifiers: *Waterloo model

The propriety of steady state simulation and the adequacy of data available for simulation are examined using two Ontario sewage plants. It was argued that the mean performance of a treatment plant could be represented using steady state models, in spite of transient operations of such plants and data deficiencies. Simulation of Kitchener Plant using conventional activated Ritchener Finnt using conventional activates studge units and a recently developed settler model proved satisfactory when the actual plant data were used. Employing the parameters obtained from 1968 data, mean performance in 1966 tained from 1968 data, mean performance in 1966 and 1967 agreed exactly with their predicted values. The simulation of the mean operation of the Kitchener plant for 4-week periods was not reliable, which could mean that that period is the shorter for 'steady state' simulation. The parameters that gave good results in a model for the Kitchener primary, actiler, were unsetting forces. ters that gave good results in a model for the kitchener primary settler were unsatisfactory when used with the model for the same unit in Humber plant; it is concluded that parameters in simulation models must be drawn from data obsimulation models must be drawn from data ob-tained for the plant being simulated. Most moderate size plants operate transiently because of the transient nature of sewage flow and dif-ferent plant operating practices. This suggests the eventual need for real time simulation using dynamic models at least to predict the per-formance of a plant at peak loads. (Morparia-Tex-W73-02212

DESIGN CONSIDERATIONS FOR LARGE TREATMENT PLANTS.

Institut fuer Wasserversorgung, Vienna (Austria).

W. von der Emde. Water Research, Vol 6, No 6, p 323-325, June

Descriptors: Cost analysis, *Design criteria, Electricity, *Treatment facilities, Waste water treatment. Identifiers: *Austria.

Design concepts based on conditions of increasing purification levels in the future, increasing wage costs, increasing shortage of labor, and compara-tively steady cost of electricity, as exist in Austria are discussed. Design guidelines with respect to the above-mentioned conditions are presented and justified. The best use of better technologies, use of computers and replacement of manual labor by electric energy wherever possible are recom-mended. (Morparia-Texas)

INDUSTRIAL WASTE AND THE SMALL CITY. Watkins (G. Reynolds) Consulting Engineers, Inc., Lexington, Ky. Special Projects. A. Lessig, and G. Schrogham. Public Works, Vol 103, No 6, p 95-96, June 1972. 1

Descriptors: *Waste water treatment, *Cost analysis, Sewage treatment, *Industrial wastes, *Kentucky, Cities, *Aeration.
Identifiers: *Lawrenceburg (Kent).

Lawrenceburg, a small city in Central Kentucky, modified its waste treatment plant to cope with additional waste processing demanded by three major industries located in the city. During the initial analysis it was found that the present facilities were inadequate to handle high strength industrial waste, and the discharge of inadequately treated effluent along with storm flows created severe unsanitary conditions. The modification of the plant has consisted of addition of 270,000 gallons capacity aerated equalization basin, two sewage pumps of 0.5 mgd, an aeration lagoon, a polishing lagoon and a chlorination tank. These improvements do not increase the capacity of the plant, but provide for greater reduction of BOD and hence a higher quality effluent. It also has the advantage of not overloading the plant even in storm flows and the wastes bypassed receive treatment and chlorination via two lagoons and a chlorination tank. The increase in the costs have been minimal and are funded jointly by the city and a Federal grant. (Morparia-Texas) Lawrenceburg, a small city in Central Kentucky,

CLOSING THE GAP IN WASTE MANAGE-

MEN.1. Resources For the Future, Inc., Washington, D.C. W.O. Spofford, Jr. Environmental Science and Technology, Vol 4, No 12, p 1108-1114, December 1970. 4 fig.

Descriptors: *Cost analysis, *Cost comparison, *Municipal refuse, Economics, Waste treatment, Waste disposal.
Identifiers: *Welfare economics, *Composting,

Private market economics

In discussing the value of composting municipal refuse, the conclusions of overall societal welfare economics and private market economics are very different. Discussed are residuals management in general and the problem faced by failure to allocate common property resources (air, water and some aspects of land) efficiently among all users. A specific example, the paper industry, is analyzed. Reducing residuals is often less costly that seem the contract of the property of analyzed. Reducing resolutions is often reso costily than recycling and reuse. The social optimum will, except in rare cases, represent a combination of reuse and virgin input. Public incentives will be required to insure that the private market optimum conforms to the social optimum. Finally, rational decisions for reuse must be made on a cost-benefit basis. (Anderson-Texas)

WHAT'S SO GREAT ABOUT MGCO3. Thompson and Tuggle, Montgomery, Ala. For primary bibliographic entry see Field 05F. W73-02219

PHOSPHORUS REMOVAL IN TRICKLING FIL-

Wisconsin Univ., Madison.

Available from University Microfilms, Inc., Ann Arbor, Michigan 48106, Order no 71-3462. Ph D. Dissertation, 1970. 250 p.

Descriptors: *Phosphorus, *Trickling filters, Biochemical oxygen demand, Mathematical models, Orthophosphates, *Waste water treatment, Model studies.

The object was to relate phosphorus removal in trickling filters to the parameters of hydraulic load, depth, recirculation, and waste strength in load, depth, recirculation, and waste strength in four 12 ft. deep pilot trickling filter models. All four of the quarter replicates of the 24 factorial experiment were duplicated during the experimental period of 24 hour surveys. The BOD removals could be described by mathematical models from the literature, and close agreement with the Germain and Eckenfelder equations was correlated with any of the parameters selected, but higher-

removals than could be accounted for by microbial requirements were consistantly measured. The analyses of the alime samples indicated that the high phosphorus removals were a result of chemical precipitation of orthophosphate with calcium and perhaps aluminum and iron. (Anderson-Texas) W73-02220

A STATISTICAL STUDY OF THE EFFECTS OF POLYELECTROLYTES, MIXING AND UPON AN ACTIVATED SLUDGE SYSTEM, Rutgers - The State Univ., New Brunswick, N.J.

Available from University Microfilms, Inc., Ana Arbor, Michigan 48106, Order No 71-3107. Ph D. Dissertation, 1970. 248 p.

Descriptors: *Domestic water, Sewage, *Polyelectrolytes, Hydrogen ion concentration, *Activated sludge, *Flocculation, Biochemical oxygen demand, *Waste water treatment, Mixing. Identifiers: *Organic carbon.

The purpose was to show that fruitful research could be conducted on the treatment of domestic sewage by the use of a statistical design to isolate the errors associated with the variable nature of domestic sewage. The effects of polyelectrolytes, pH, and degree of mechanical mixing in a high rate activated sludge system at 20 C on absorption and metabolism in the mixed liquor and on flocculation in a simulated secondary clarifier effluent were studied. The responses measured were: for absorption, unabsorbed soluble soluble organic carbon; for metabolism, oxygen uptake; for flocculation, suspended carbon in a simulated secondary clarifier effluent. The statistical design was successful in yielding the precision needed for detecting differences among treatments. Ancillary parts ing differences among treatments. Ancillary parts of the study were correlations of : suspended carbon with mixed liquor streaming current intensity and conductivity; of primary effluent BOD with total organic carbon and with soluble organic cartotal organic carbon and with soluble organic car-bon; and, of suspended solids with suspended car-bon in a simulated secondary clarifier effluent. All of these correlations showed a significant linear relation between variables. (Anderson-Texas) W73-02221

REMOVAL OF TOXIC PESTICIDES BY REVERSE OSMOSIS WATER TREATMENT, Massachusetts Univ., Amherst. Dept. of Civil En-

Master's Thesis, December 1968. 104 p, 19 fig, 10 tab, 59 ref, 3 append.

Descriptors: *Reverse osmosis, *Waste water treatment, *Pesticide toxicity, Pesticide removal, Membranes, Chlorinated hydrocarbons, *Alpylbenzene sulfonates, Detergents.
Identifiers: Lindane, Pentachlorophenol.

A cellulose acetate membrane and low water pressure were used to determine the feasibility of removing trace organic contaminants, particularly the chlorinated hydrocarbon pesticide lindane, from water. The effects of molecular weight, size and geometrical configuration on the rejection ef-ficiency with a cellulose acetate membrane were determined by using pure compounds of known low molecular weight organic materials. The mem-branes used showed satisfactory rejection of alkyl benzene sulfonate (ABS) at low pressures of 30 to 50 psi and a variation of rejection from 79 to 41 percent of ABS in the concentration range of 0.5 to 4 ppm. Lindane rejection efficiency was low in the concentration range of .00739 to 1.93 mg/1 at 30 to 50 psi. Pentachlorophenol results indicate solute rejection at 50 psi and permeate enrichment at 30 psi. (Smith-Texas)
W73-02222 15 TOWNS Jo Belante, Clau W. G. Karam Water and Wa 31, July 1972.

Descriptors: sis, Economy ties, Cities, O Identifiers: *)

15 Pennsylva formed an A stopping th Lackawanna by a bond is state and fed tion and initis born by prop out. As a res co-operation Commission cided to conat various p system has p cally more ef W73-02223

MAGNESIU TUP, Great Northe R. C. Keef. Tappi, Vol 5

Descriptors: um compour tion, Sulfur oxygen dema Identifiers: tions, *Magn

Having bee bisulfite sy represented investment of for their par tonnage requ um bisulfite um system. new system : 80% in BOI The equipm five-effect, acid system integrated v solids per d evaporator v recovery are evaporation come by in fourth and fi W73-02224

STUDIES WATER PO (Ontario). D T. Matsuura Water Rese tember, 1972

Descriptors: treatment, tion control sure, Separa Identifiers:

15 TOWNS JOIN HANDS, Belante, Clauss, Miller and Nolan, Inc., Scranton,

W. G. Karan Water and Wastes Engineering, Vol 9, No 7, p 29-31, July 1972. 3 fig.

Descriptors: *Waste water treatment, *Cost analysis, Economy, *Pennsylvania, *Treatment facilities, Cities, Operating costs. *Lackawanna River (Penn).

15 Pennsylvania communities got together and formed an Authority to tackle the problem of formed an Authority to tackle the problem of stopping the polluted water flowing into Lackawanna river. The project had to be funded by a bond issue of \$21,800,000 plus a combined state and federal grant of \$3,818,000 for installa-tion and initial operation, the operating costs being born by property owners. The proper formula for the rates per equivalent dwelling units was worked out. As a result of extensive feasibility studies in out. As a result of extensive feasibility studies in co-operation with Lackawanna County Planning Commission and other local agencies, it was decided to construct four separate treatment plants at various points along the river. The overall system has proved to be technically and economically more efficient; the river conditions also have improved. (Morparia-Texas)

MAGNESIUM BISULFITE RECOVERY STAR-

TUP, Great Northern Paper Co., Millinocket, Maine.

Tappi, Vol 54, No 4, p 564-567, April 1971. 1 fig. 1

Descriptors: *Water pollution control, *Magnesium compounds, *Pulp wastes, Design, Optimization, Sulfur compounds, Recycling, Biochemical oxygen demand, *Water reuse, Chemical wastes. Identifiers: *Chemical pulping, *Recovery operations, *Magnesium bisulfite.

Having been convinced that the magnesium bisulfite system with red liquor recovery represented the lowest operating cost and capital represented the lowest operating cost and capital investment of various proven pulping processes for their particular pulp brightness, strength, and tonnage requirements, managers of a 600 ton sodium bisulfite pulp mill converted it to the magnesium system. The experiences and operation of a new system are described. Reduction of more than 8006, in ROD, basels of the efficiency of more than 80% in BOD levels of the effluents is reported. The equipment components purchased include a five-effect, aix-body evaporator; a three-stage inve-tiect, aix-body evaporator, a inter-stage acid system and a cyclone evaporator. These are integrated with a Babcock and Wilcox water walled boiler burning up to 1,660,000 lb. of red solids per day. Special equipment put in use includes an automatic Tenor central system for the evaporator wash cycle and an acid central system at the venturies. All major startup problems in the at the venturies. All major saturp process in the recovery area have been solved except that with evaporation capacity which is expected to be over-come by installing forced circulation pumps in fourth and fifth units. (Morparia-Texas) W73-02224

STUDIES ON REVERSE OSMOSIS FOR WATER POLLUTION CONTROL, National Research Council of Canada, Ottawa (Ontario). Div. of Chemistry. T. Matsuura, and S. Sourirajan. Water Research, Vol 6, No 9, p 1073-1086, September, 1972. 5 fig, 5 tab, 19 ref.

Descriptors: *Reverse osmosis, *Waste water Descriptors: "Reverse osmosis, "Waste water treatment, "Phosphates, "Nitrates, Water pollu-tion control, "Aqueous solutions, "Osmatic pres-sure, Separation techniques, Chemical wastes. Identifiers: "Cellulose acetate membranes. Studies were carried out for reverse osmosis separations of common pollutants such as sodium ortho and polyphosphates, lecithin, ethyl phosphate, sodium nitrate, nitrite, chloride, fluoride, sulfate, ammonium chloride, glutamic acid and phenol low solute concentrations. The osmotic pressures of such wastewater solutions are usually small and hence the osmosis had been studied at solute concentrations less than 2000 ppm using improved porous cellulose acetate membranes at 250 psig. Solute separations were essentially independent of feed concentrations under the test conditions used. With a film preshrunk at 82C, the solute separations for sodium phosphates, NaNO3, NaNO2, NH4Cl, glutamic acid, NaCl, NaF and Na2SO4 were 99.6, 91.2, 91.6, 95.3, 99.1, 96.2, 96.6 and 99.2 percent respec-91.0, 93.3, 93.1, 93.2, 90.0 and 93.2 percent respec-tively and the average membrane flux was 14.4 gpd ft.-2. The separations for the same solutes with a film pre-shrunk at 75C have been compared with the above results. It is concluded that the low pressure reverse osmosis could be applied to treat the wastewaters containing low concentrations of chemical pollutants listed above. (Morparia-Tex-

THE EYES OF TEXAS ARE ON U.S. GYPSUM, U.S. Gypsum Co., Galena Park, Tex.

Water and Wastes Engineering, Vol 9, No 7, p D4-D8. July 1972. 5 fig.

Descriptors: *Waste water treatment, Water pollu-tion, Sludge disposal, *Plant design, Effluent quality, *Fexas, Biochemical oxygen demand, *Sewage treatment, Pulp wastes, Chemical wastes, *Water reuse, *Treatment facilities. Identifiers: *Houston Ship Channel.

A paper mill's successful efforts to solve the problem of effluent discharge to the Houston Ship Channel, which was high in suspended solids, setteable matter, BOD and COD are reported. One million dollars was spent from 1967 to 1970 on three phases of the program. Hinde Engineering Air-Aqua Aeration System was evolved to provide complete secondary treatment, including initial settling, biological oxidation, final settling, sludge disposal, odor control and effluent polishing. The discharge levels of the effluent represent 98.5% removal of BOD and 97.5% removal of solids and settleable matter, and is acceptable to be reused by the mill. The company expects to reuse 95 to 100% of the water now discharged, thus reducing the amount of discharge into the channel. (Morparia-W73-02726

SAVING THE DRAGOUT KEEPS PLATER WITHIN DISCHARGE LIMITS,

Industrial Finishing, Vol 38, No 10, p32-36, October 1972. 9 fig.

Descriptors: *Industrial wastes, *Nichel, Effluents, *Waste water treatment.
Identifiers: *Plating wastes, *Dragout.

By devising a system to save the dragout, West Town Plating Associates has reduced the nickel content of their effluent from 65 parts per million to 5 parts per million. Whereas previously 100 pounds of nickel sulfate addition were required every two weeks, no new additions have been needed since the introduction of this system 18 needed since the introduction of this system 18 months ago. The purchase of a centrifugal dryer was the only expenditure required to implement the system. Treatment of the recovered nickel bath uses only small amounts on inckel carbonate, hydrogen peroxide, and activated carbon. (Murphy-Texas)
W73-02227 FILTRATION BOASTS TERTIARY TREAT-MENT, MIXED-MEDIA FILTERS, PLUS FILTER AIDS, TURN IN A TOP PER-

FILTER AIDS, TURN IN A TOP PER-FORMANCE, Neptune Microfloc, Inc., Corvallis, Oreg. H. C. Shireman. Water and Waste Engineering, New York, Vol9, No4, p34-37, April, 1972.

Descriptors: *Filters, *Tertiary treatment, Carbon adsorption, *Waste water treatment, *Filteration. Identifiers: *South Tahoe PUD, Optimum filtration design, Filtration costs, Filter controls, Filter aids, Mixed-media filters.

In-depth, coarse-to-fine filtration in mixed media downflow beds, utilizing alum or polymer filter aids, can play an important part in many overall treatment schemes. Coarse-to-fine filtration adds to overall plant reliability in terms of continuous operation, consistent effluent quality, and backing up biological and chemical treatment upsets. Filtration prior to granular carbon adsorption protects the carbon against fouling by suspended solids and colloidal matter. The selection between pressure filters or open gravity beds is based on solids and colloidal matter. The selection between pressure filters or open gravity beds is based on the overall economies of pumping and construction materials. Lime, alum, or nonionic, anionic, or cationic polymers may be used as filter aids on mixed media beds, and can maintain turbidity as low as 0.05 TrU. The optimum dose of filter aid allows the terminal head loss (usually 10 ft.) and turlows the terminal head loss (usually 10 ft.) and burbidity breakthrough (about 1 to 2 ITU) to occur simultaneously. Filter underdrain systems are used to support the filter media, collect the filtered water, and distribute the backwash water uniformly over the bed. A bed of supporting gravel (usually 8 to 18 in. in depth and 2 in. to 10 mesh in gradiation) is used between the fine media and the underdrain. In sewage filters, a 3 in. thick layer of coarse (1 mm) garnet is needed between the fine media and supporting gravel. A detailed evaluation of mixed media filters on stream in South Tahoe from 1965 to 1970 is included along with typical removals, cost tables, and a flow diagram. (Barron-Texas) ron-Texas) W73-02229

MINNESOTA POLLUTION CONTROL AGEN-CY V. HATFIELD (PUBLIC EXPENDITURES FOR WATER POLLUTION ABATEMENT AS A LEGITIMATE PUBLIC PURPOSE). For primary bibliographic entry see Field 06E. W73-02240

CONFERENCE REPORT ON S.2770, AMEND-ING FEDERAL WATER POLLUTION CON-TROL ACT. For primary bibliographic entry see Field 06E. W73-02256

POLLUTION CONTROL SHINES IN CHROME CHEMICALS PLANT.
For primary bibliographic entry see Field 05G.
W73-02282

TOWARDS GREATER WATER RE-USE, R. A. Granville.
Paper Technology, Vol 13, No 1, p 9, 13, Februa-

scriptors: *Pollution abatement, *Water reuse, *Waste water treatment, Pollutants, Profit, Direct benefits, Indirect benefits, Pulp wastes. Identifiers: *Paper and board industry, Effluent

Estimates indicate that the United Kingdom's paper and board industry takes in around 200,000 million gallons of fresh water a year. Less than half of this amount is used for the paper and board manufacturing process. The moisture content of the incoming raw materials is not much different

Group 5D—Waste Treatment Processes

from the industry's final product. Consequently, the volume of mill effluent roughly equals the quantity of fresh water used for process purposes. This relationship between process-water intake and mill effluent volumes emphasizes the need to re-use water in order to provide the total amount required by the process. Through water re-use, the water intake is reduced, as is the volume of effluent which must be discharged directly from an effluent treatment system to a sewer or to any other authorized place. When water re-use reduces the volume of effluent from a mill, the concentration of pollutants rises. However, the total pollutants load discharged into the river is decreased. If water is not re-used to its full extent, the present costly losses of furnish materials and chemicals will continue and larger, more costly, effluent will continue and larger, more costly, effluent treatment plants will be required. (Settle-Wisconsin) W73-02286

THE ECONOMICS OF AUTOMATION IN WASTEWATER TREATMENT, Environmental Protection Agency, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.

Water-1971, American Institute of Chemical Engineers Symposium Series, Vol 68, No 124, p 460-461, 1972.

Descriptors: *Waste water disposal, *Waste water treatment, *Automation, *Instrumentation, Economic efficiency, Management, Costs, Quality control, Control.

Identifiers: Cost reductions, Quality improve-

The amount of instrumentation and automation in-stalled in wastewater treatment plants should ultistalled in wastewater treatment plants should ultimately be determined on an economic basis. In a profit-making industry the degree of instrumentation and automation will logically be a function of the profit potential associated with plant automation. However, since the effect of damage to the environment is difficult to quantify, such a profitability analysis is not as straight-forward for a mucinal wastewater treatment plant. A sounder an micipal wastewater treatment plant. A sounder approach is to assume that some level of effluent quality is required and examine the impact of new instrumentation and automation on either improv-ing the effluent quality or on reducing the cost of ing the effluent quanty or on reducing the cost of treatment when the effluent quality is fixed. Potential advantages arising from instrumentation and automation include improved effluent quality, reduced disposal cost, better adaption of time varying loads, reduced operating and maintenance costs, reduced variability of effluent quality, imcosts, resuced variability of effluent quality, im-proved management surveillance, reduced equip-ment and structure size, improved detection of in-cipient problems, and improved treatment relia-bility. (Settle-Wisconsin) W73-02293

WASTEWATER TREATMENT WORKS PLANNING, ECONOMICS AND TECHNOLO-GY-SOME NEW DIRECTIONS,

Environmental Protection Agency, Washington, D.C. Office of Water Programs.

Water Research, Vol 6, No 4-5, p 315-318, April-May, 1972. 9 ref.

Descriptors: *Waste water treatment, *Planning, Technology, Environmental effects, Water pollu-tion, Pollution abatement, Treatment facilities. Identifiers: *Cost effectiveness, Environmental Protection Agency, Environmental Impact State-

Several aspects of wastewater treatment are briefly discussed. One major problem associated with wastewater treatment is that of determining needs and related costs for waste treatment facili-ties. To help obtain this information, the Environ-mental Protection Agency has established a

system designed to provide reliable and creditable data on currently predictable needs. Effective water quality management planning should be a continuous process of systematic and coordinated development of an efficient and effective course of action. Ideally, plans will be developed for two major geographic areas: (1) urban concentrations and groups of small towns, and (2) total river basin hydrologic systems. The cost effectiveness aspect of waste treatment suggests that in many instances. hydrologic systems. The cost effectiveness aspect of waste treatment suggests that in many instances neighboring communities should treat their wastes jointly in systems designed to minimize pumpage over hydrographic boundaries. The development and usage of new technology in waste treatment is strongly encouraged by the Environmental Protection Agency. The Agency has established the Technology Transfer Program to help bridge the gap between development and demonstration of new treatment methodology and its actual acceptance and full-scale use. The National Environmental Policy Act of 1970 is briefly discussed, with an emphasis on the environmental impact statements required under the Act. (Settle-Wisconsin) W73-02296

MEASURES OF ORGANIC POLLUTANTS IN WASTEWATER TREATMENT PLANT OPERA-TIONS, Connecticut Univ., Storrs, Dept. of Environmen-

tal Engineering. T. Helfgott, and K. E. Neumann.

Hengott, and K. E. Neumann.
 Reprint from Water 1971, American Institute of Chemical Engineers Symposium Series, Vol 68, No 124, August 1972. 17
 5 tab, 4 fig, 6 ref. OWRR-A-030-CONN (1) 14-01-0001-3007.

Descriptors: *Waste water treatment, *Organic wastes, *Automatic control operations, *Tertiary treatment, Sewage effluents, Biological oxygen demand, Chemicaloxygen demand, Ammonia, Nitrates, Pollution loading, Statistical correlation analysis, Treatment facilities.

analysis, Freatment facilities.
Identifiers: *Sewage treatment plants, *Real time responses, *Microcoulometric titration, Total oxygen demand, Total organic carbon, Total nitrogen, Total Kjeldahl nitrogen, Apparent degradation, Diurnal variations, Reductive pyroly-

Objectively oriented criteria are discussed on measures of organics that can be used to characterize wastewaters. Such characterizations can lead to wastewaters. Such characterizations can least to automated treatment plant operations. Lists of direct measures of organics are included showing that with the exception of TOD, TOC, and, possibly, TN, these do not lend themselves to real-time responses necessary for automatic control and operation of sewage treatment plants. Lists of signal transmitters, process response tests, and the behavioral measures of organics are also included along with experimental data on the different along with experimental data on the different nitrogen form changes that occur in a tertiary sewage treatment plant. Data include organic carbon and nitrogen changes (TOD, BOD, TKN, NO3, NH3) and the apparent degradation of organics as measured by TOD, COD, BOD, and TON. An example of the diurnal variation of pollution loading of a sewage treatment plant is shown. Criticisms are made of statistical correlations among marginally related organic parameters. Original data using TN determinations (high temperature reductive pyrolysis of all nitrogen forms, except N2 to ammonia, followed by microcoulometric titration) are presented along with the concept of Total Oxidizable Nitrogen as another measure of organics. W73-02334

ANALYSIS OF RESIDUAL TOTAL NITROGEN IN WASTEWATERS, Connecticut Univ., Storrs. For primary bibliographic entry see Field 05A.

SEPARATION OF LIGNIN FROM AQUEOUS SOLUTION BY ADSORPTIVE BUBBLE SEPARATION PROCESSES, Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering. Mu-Hao-Sung Wang.
Doctoral Thesis, October 1972. 241 p, 46 fig, 25 tab, 145 ref, append. OWRR A-022-N.J. (3).

Descriptors: *Water quality, *Separation techniques, Water pollution control, Water purification, *Absorption, Pulp wastes, *Lignins, *Waste water treatment, Flotation.
Identifiers: *Ion flotation, *Bubble separation.

The feasibility of using suitable types of adsorptive bubble separation methods to remove lignin from pulp mill effluents as well as from river waters was investigated. High recoveries of lignin can be achieved provided that an optimum ratio of lignin to collector is used. Potential applications of the interface and the premoval of the interface areas include the removal of lignin to collector is used. Potential applications of the ion flotation process include the removal of kraft lignin from kraft pulp mill effluent, lignin sulphonate from the sulfite pulp mill effluent, and dilute lignin from river water. Continuous mul-ticolumn operation of the ion flotation system achieves a high degree of separation and is a promising method. (Whipple-Rutgers) W73-02350

NONLINEAR OPTIMAL CONTROL THEORY NONLINEAR OPTIMAL CONTROL THEORY
APPLIED TO A DISTRIBUTED FEED
BIOCHEMICAL RIVER REACTOR WITH
DUAL WATER QUALITY AND SELF PURIFICATION RESTRAINTS,
Rutgers - The State Univ., New Brunswick, N.J.
Dept. of Chemical and Biochemical Engineering.
For primary bibliographic entry see Field 05G.
W73-02352

THE INDUSTRIAL DEMAND FOR WATER AND WASTE TREATMENT IN SELECTED U.S. CITIES WHICH ARE LEVYING SURCHARGES, North Carolina State Univ., Raleigh. Dept. of Economics. For primary bibliographic entry see Field 05G. W73-02361

MECHANISMS OF CHANGE IN ACTIVATED SLUDGE DEWATERABILITY DURING AERO-

SLUDGE DEWATERABILITY DURING AERO-BIC DIGESTION, Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering. A. Rivera-Cordero. Ph.D. Thesis, March 1972, 203 p, 80 fig, 1 tab, 133 ref. OWRR A-035-VA (5).

Descriptors: *Activated sludge, *Sludge treatment, *Dewatering, Chlorination, Aerobic conditions, *Waste water treatment, Flocculation, Hydrogen concentration.

Identifiers: *Aerobic digestion.

Identifiers: *Aerobic digestion on activated sludge dewaterability were studied and an attempt was made to define the mechanisms responsible for these changes. Activated sludge samples were obtained from three full-scale wastewater treatment plants and then studied in the laboratory. Changes in sludge dewatering properties were measured by specific resistance and compressibility factor. In addition to chemical properties such as pH, exocellular polymer concentration, and alkalinity, a technique for measuring the median particle size of the activated sludge flox was devised and related to sludge dewaterability. The results showed that both specific resistance and the compressibility factor of activated sludge are affected by aerobic digestion. Specific resistance cercases with digestion whereas the compressibility factor increases. Optimum conditions are generally obtained after 1 to 5 days of aeration and further aeration worsens dewatering. Contrary to previous reports, the relationship between dewaterability and exocellular polymer concentra-

tion was int The median of both spe Changes in digestion, claddition. (Jo W73-02362)

WATER I UNITED ST National Wa For primary W73-02366

PREVENTI DUSTRIAL Water Polli gland). A. B. Whea Proceedings Water Poll Petroleum, Reprint No

Descriptors wastes, *O Gravity, Fil Identifiers:

Water pollu matter of c abate this t by industry protection oil used in noff. Oil reduced to treatment 1 or oil abso must be tr authorities discharge i to prevent prevent po ling-Texas W73-02434

> GROUNDY TRANSFO OF A NE (AND MAI Arizona W For primar W73-02438

> GROUND AND MAI Arizona U Engineerin For primar W73-02439

EVALUAT SYSTEM WATER. Arixona U Engineering For prima W73-0244

RESISTA COMPOU TIVATED G. W. Mal H. Hicker tion was inverse. Apparently pH strongly affects the flocculating properties of the natural polymers. The median particle size was an excellent indicator of both specific resistance and compressibility. Changes in median particle size occur with aerobic digestion, chlorination, anaerobiosis, and polymer addition. (Johnson-Virginia Tech)

WATER POLLUTION CONTROL IN THE UNITED STATES,
National Water Commission, Arlington, Va.

For primary bibliographic entry see Field 05G. W73-02366

PREVENTION OF POLLUTION FROM THE IN-DUSTRIAL USE OF OIL, Water Pollution Research Lab. Stevenage (En-

gland). A. B. Wheatland.

A. b. wheatund.

Proceedings of Seminar sponsored by Institute of Water Pollution Control and the Institute of Petroleum, (Water Pollution Research Laboratory Reprint No 617), May 1970, 7 p, 11 ref.

Descriptors: Water pollution control, *Industrial wastes, *Oil, *Waste water treatment, Filters, Gravity, Filtration, *Pollution abatement.

Identifiers: Oil absorbing powders.

Water pollution by oil discharged by industries is a matter of concern. Primary measures required to abate this type of pollution are good housekeeping by industry, proper design to provide adequate protection against spills and means for collecting oil used in industrial processes or in surface runoff. Oil concentration in wastewaters can be reduced to the specified level through a variety of reduced to the specimen tree through a variety or treatment processes, filtration, gravity separation or oil absorbent powders. Industrial wastewaters must be treated to the quality required by local authorities before discharge into public sewers or to the level required by the river authorities before discharge into rivers. Such treatment is necessary tascnarge into rivers. Such treatment is necessary to prevent inhibition of sewage treatment or to prevent pollution of the receiving waters. (Goessling-Texas) W73-02434

GROUNDWATER RECHARGE AND QUALITY TRANSFORMATIONS DURING INITIATION OF A NEW SEWAGE STABILIZATION POND (AND MANAGEMENT),

Arizona Water Resources Research Center, Tuc-

For primary bibliographic entry see Field 05B. W73-02438

GROUNDWATER RECHARGE AND QUALITY TRANSFORMATIONS DURING INITIATION
AND MANAGEMENT OF A NEW STABILIZA-TION LAGOON.

Arizona Univ., Tucson. Dept. of Soils, Water and

Engineering.
For primary bibliographic entry see Field 05B.
W73-02439

EVALUATION OF A TURFGRASS-SOIL SYSTEM TO UTILIZE AND PURIFY WASTE

WATER, Arixona Univ., Tucson. Dept. of Soils, Water and Engineering. For primary bibliographic entry see Field 05B. W73-02440

RESISTANCE OF CARCINOGENIC ORGANIC COMPOUNDS TO OXIDATION BY AN TIVATED SLUDGE, Vanderbill Univ., Nashville, Tenn. G. W. Malaney, P. A. Lutin, J. J. Cibulka, and L.

H. Hickerson.

Journal Water Pollution Control Federation, Vol 39, No 12, p 2020-2029, Dec 1967. 4 fig, 11 tab, 12

Descriptors: *Waste water treatment, Water pollution, Degradation, Organic matter, *Oxidation, 'Activated shuger' identifiers: *Carcinogens.

A laboratory study in which 27 compounds A laboratory study in which 27 compounds representative of organic substances known to induce cancer in laboratory animals were subjected to oxidation by activated sludge in a Warburg aparatus revealed that the sludges were unable to effect significant removals within the detention times normal in wastewater treatment plants. Sludges were drawn from three operating treat-ment plants in Tennessee, two with conventional ment plants in Tennessee, two with conventional activated sludge processes and the third with an extended aeration process. Some variations in removal were noted, depending on the type of sludge, the compound, and sludge concentration, but the study as a whole showed the carcinogens to be very resistant to biological treatment. (Bean-AWWARF) W73-02535

METHODOLOGY IN ESTABLISHING WATER

QUALITY STANDARDS, Washington Univ., Seattle. For primary bibliographic entry see Field 05G. W73-02536

ANION EXCHANGE AND FILTRATION TECHNIQUES FOR WASTEWATER RENOVA-

Stanford Univ., Calif. Dept. of Civil Engineering. R. Eliassen, and G. E. Bennett. Journal Water Pollution Control Federation, Vol 39, No 10, Part 2. p R82-R91, October 1967, 5 fig, 6 tab, 1 ref.

Descriptors: *Water treatment, *Waste water treatment, *Filtration, Costs, *Ion exchange, *Diatomaceous earth, Phosphorus, *Water reuse, *Activated sludge.

Pilot-scale studies of renovation of activated sludge effluent for reuse by rapid sand filtration and ion exchange revealed that substantial removals of phosphorus and nitrates of about 84 and 77 percent, respectively, can be achieved. Nutrient removals resulted in an 8-fold reduction of algal productivity in 16 days. High chloride contents reduce the effectiveness of anion exchange. Restoration of the capacity of fouled resin can be achieved by the acid-methanol treatment.

Diatomite filtration of activated sludge effluent requires proportioning of the body feed to the effluent quality. Costs of renovated water for surface storage are about 17-19 cents/1,000 gal (4.5-5.0 cents/cu m). (Bean-AWWARF) W73-02537

VIRUCIDAL EFFECTS OF CHLORINE IN WASTEWATER,
Maine Univ., Orono. Dept. of Civil Engineering.

Journal Water Pollution Control Education, Vol 39, No 11, p 1834-1849, Nov 1967. 12 fig, 1 tab, 20

Descriptors: *Waste water treatment, Disinfec-tion, *Chlorination, Pathogens, *Viruses, Water pollution, Coliforms, Analytical techniques, *Viri-

Over 100 different viruses are excreted in feces by man. Modern wastewater treatment practices must prevent these viruses from being discharged to recreational waters and raw water supplies. Fifteen waste samples were studied, representing both primary and trickling filter effluents. Four levels of chlorine dosage were varied at a 30-min

contact time and the same four levels of dosa contact time and the same four levels of dosage were studied at contact times ranging from 5 to 120 min. The reliability of the coliform group as an indicator of virus inactivation was tested and found inadequate. Amperometric chlorine residuals were a consistent indication of the virucidal capacity of chlorinated settled wastewater and trickling filter effluent; orthotolidine arsenite chlorine residuals showed no direct correlation. The inactivation of virus in the effluents tested did not follow Chick's aw of disinfection. The time of contact is more important than dosage for virus inactivation in excess of 90 percent for the wastes tested. (Bean-AWWARF)
W73-02538

EXPERIENCES WITH WASTEWATER DISIN-FECTION IN CALIFORNIA, California State Dept. of Public Health, Sacramen-

G. E. Browning, and F. R. McLaren.

Journal Water Pollution Control Federation, Vol
39, No 8, p 1351-61, Aug 1967. 4 fig, 5 tab, 9 ref.

Descriptors: *Water treatment, *Waste water Descriptors: "Water treatment, "Waste water treatment, "Disinfection, "Bacteria, Microorgan-isms, "Chlorination, "Coliforms, "California, Standards, Analytical techniques.

Most probable number of coliforms (MPN) is used as the primary standard of wastewater disinfection in California. Studies by the State Department of Public Health have shown that this parameter exruonic reatin nave snown that this parameter ex-hibits great variation, even over very short time periods in a single plant. Delayed analysis of sam-ples decreases the quantitative significance of MPN results. Several formats for defining adequate disinfection are in use. Some are based on median MPN, maximum MPN, and frequency of sampling required for the determination; others are based on chlorine residual. The modified starch-iodide method of determining chlorine residual seems satisfactory for wastewater analysis. Study data show the approximate relationship between MPN and chlorine residual. Better design of chlorine-contact facilities is needed. (Bean-AW-WARF) W73-02539

EVALUATING ECONOMY OF SCALE, Wisconsin Univ., Madison. Dept. of Civil En-

gineering. P. M. Berthouex Journal Water Pollution Control Federation, Vol 44, No 11, p 2111-2119, November 1972. 6 fig, 7 tab, 18 equa, 23 ref.

Descriptors: *Economies of scale, *Cost analysis, Water treatment, Waste water treatment, *Treat-ment facilities, Design data, Equipment, Installa-tion costs, Decision making, Equations, Optimiza-

Identifiers: *Economic analysis, *Unit of capaci-ty, *Design capacity, Composite systems, Multi-ple units.

Normally, a unit of capacity in a large waste treat-ment plant costs less than a unit of capacity in a small plant. Knowledge of the economy of scale can often provide useful design information even can often provide useful design information even in o estimate of total cost is made. The cost exponent M of the 'six-tenths rule,' a simple, yet useful economic parameter, indicates the economy of scale of a plant, process, or piece of equipment. The magnitude of the exponent M provides a simple yet effective measure of the economy of scale associated with building extra capacity. As M gets smaller, there is greater inventive to his M gets smaller, there is greater incentive to build extra capacity to provide reliability and flexibility extra capacity to provine reanounty and rextonity for the future and capacity for future growth. Values of M for several types of treatment plants are given, and their use in selecting design capacity, scaling up process cost estimates, estimating costs of composite systems, and analyzing multiple unit installations is discussed. In all cases,

Group 5D—Waste Treatment Processes

simply knowing the magnitude of the cost ex-ponent M enables the designer to make useful decisions. The reported correlations often group single- and multiple-unit systems; thus accuracy is lost. More detailed and accurate cost data would be valuable for practicing system optimization.
(Bell-Cornell) W73-02542

EFFICIENCY AND UTILITY OF COLLOCA-TION METHODS IN SOLVING THE PER-FORMANCE EQUATIONS OF FLOW CHEMI-CAL REACTORS WITH AXIAL DISPERSION, Kansas State Univ., Manhattan. Dept. of Chemi-

cal Engineering. L. T. Fan, G. K. C. Chen, and L. E. Erickson. Chemical Engineering Science, Vol 26, p 379-387. 1971. OWRR A-029-KAN (2).

Descriptors: *Computer programs, Computer models, Model studies, Waste water treatment, *Dispersion, Flow, Diffusion Identifiers: *Collocation method, *Flow chemical reactors, Boundary value problem, *Diffusion models.

A computational approach, which involves a collo-cation method and a scheme for progressively selecting an increasing number of collocation points, is introduced to obtain an approximate solution of an arbitrary degree for a highly non-linear unsymmetrical boundary value problem. The approach is straightforward; a general com-puter program which can be readily adapted to any type of reaction has been written to describe the type of reaction has been written to describe th performance of flow chemical reactors with axial dispersion. The computational approach does not employ any numerical integration scheme; therefore, this approach is free of the stability difficulties and time requirements associated with numeri-cal integration. Results that are accurate to four significant digits can be obtained in a few seconds using an IBM 360/50 digital computer.

MODELING AND OPTIMIZATION OF A TOWER-TYPE ACTIVATED SLUDGE SYSTEM, Kansas State Univ., Manhattan. Dept. of Chemi-

S. S. Lee, L. E. Erickson, and L. T. Fan. Biotechnological and Bioengineering Symposium No 2, p 141-173. 1971. 16 fig, 15 ref. OWRR A-029-KAN (3).

Descriptors: *Activated sludge, *Waste water treatment, Mathematical models, Sedimentation, *Optimization, Model studies, Volume, Biological treatment.
Identifiers: *Tower-type system, Backflow.

A mathematical model of a tower-type biological waste treatment system is proposed. The model inwaste treatment system is proposed. The model in-cludes parameters representing fluid backflow and cell sedimentation. The model is employed to determine the optimal volume requirements of the system under various values of percentage treat-ment, saturation constant in the kinetic expres-sion, cell sedimentation, and fluid backflow. All factors except the fluid backflow affect signifi-cantly the optimal volume requirements. The in-fluence of the fluid backflow is slight but noticea-

MODELING AND ANALYSIS OF WASHOUT IN TOWER FERMENTATION PROCESSES, Kansas State Univ., Manhattan. Dept. of Chemical Engineering. L. E. Erickson, S. S. Lee, and L. T. Fan. (1970) 35 p, 18 fig, OWRR A-029-KAN (4).

Descriptors: *Model studies, Mathematical models, *Washouts, *Waste water treatment, *Fermentation.

*Tower fermentors, Hydraulic Identifiers: parameters, Feed geometry.

The washout behavior of tower fermentors with different hydraulic characteristics (backflow, cell sedimentation, and feed geometry) is investigated. General characteristic equations for washout are developed for a variety of feed and discharge geometries. Results show that it is possible to greatly increase the operating range by adjusting the hydraulic parameters and feed geometry; however, increasing the number of stages usually decreases the washout dilution rate. A detailed analysis of washout for several different cases is presented. presented.

5E. Ultimate Disposal of Wastes

EFFECT OF ANIMAL WASTES APPLIED TO SOILS ON SURFACE AND GROUND WATER SYSTEMS, Maine Univ., Orono. Dept. of Soil Sciences. For primary bibliographic entry see Field 05B. W73-01960

TREATMENT OF WASTE SLUDGES FROM WATER PURIFICATION PLANTS, Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center. For primary bibliographic entry see Field 05F. W73-01964

ENVIRONMENTAL MONITORING AND DISPOSAL OF RADIOACTIVE WASTES FROM U.S. NAVAL NUCLEAR-POWERED SHIPS AND

THEIR SUPPORT FACILITIES, Naval Ship Systems Command, Washington, D.C. For primary bibliographic entry see Field 05B. W73-01982

CONCENTRATION OF BRINES BY SPRAY

EVAPORATION, Colorado State Univ., Fort Collins. George O. G. Lof, J. C. Ward, S. Karaki, and A. Dellah.

Deuan.

For sale by Supt. of Docs., U.S. Govt. Printing Office, Wash., D.C. 20402 for \$1.50. Office of Saline Water, Research and Development Progress Report No 764, January 1972. 195 p, 43 fig, 45 tab, 56 ref, 2 append. 14-01-0001-2276.

Descriptors: *Brine disposal, *Evaporation, Ponds, *Heat transfer, Costs, *Desalination, Waste disposal.

Identifiers: *Spray systems, Evaporation system, *Nozzle design, Inland desalting plants, Evaporation ponds.

One method of disposing of waste brine from desalting plants at inland locations involves the evaporation of the water from the brine by solar evaporation of the water from the orne by solar energy in large water-tight ponds. The purpose was the use of spray nozzles to enhance evapora-tion and thus reduce the size and cost of the solar pond. The research work included the following tasks: (1) a theoretical determination of mass transfer coefficients; (2) experimental verification in wind tunnel and outdoor spray system, and (3) computerized evaluation of spray evaporation in four specific locations. The use of spray nozzles significantly increased the net evaporation rate, and thus the size of the solar pond is reduced. (OSW abstract)

WATER AND SEWAGE SLUDGE ABSORPTION

BY SOLID WASTE, Stone (Ralph) and Co., Inc., Los Angeles, Calif. For primary bibliographic entry see Field 05D. W73-02191

WATER POLLUTION BY OIL-FIELD BRINES AND RELATED INDUSTRIAL WASTES IN

AND RELATED INDUSTRIAL WASTES OHIO, Ohio State Univ., Columbus. Dept. of Geology. For primary bibliographic entry see Field 05B. W73-02192

PROMPT PASSAGE OF OCEAN DUMPING BILL IS URGED, Senate, Washington, D.C. For primary bibliographic entry see Field 06E. W73-02255

WATER QUALITY IMPROVEMENT IN BOSTON HARBOR,

Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office. For primary bibliographic entry see Field 06G. W73-02303

A STUDY OF SEDIMENTS FROM BEL-LINGHAM HARBOR AS RELATED TO MARINE DISPOSAL, International Pacific Salmon Fisheries Commis-sion, Cultus Lake (British Columbia). Cultus Lake

For primary bibliographic entry see Field 05C. W73-02461

5F. Water Treat:nent and **Ouality Alteration**

ECONOMIC ANALYSES OF OPTIMAL WATER QUALITY MANAGEMENT, Purdue Univ., Lafayette, Ind. Water Resources Research Center. For primary bibliographic entry see Field 05G. W73-01951

TREATMENT OF WASTE SLUDGES FROM WATER PURIFICATION PLANTS, Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center. P. H. King, H. M. Bugg, J. W. Olver, and D. G.

Available from the National Technical Informa-tion Service as PB-213 177, \$3.00 in paper copy, \$9.95 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 52, Sep-tember 1972. 3 tab, 19 fig, 18 ref. OWRR A-030-VA (3).

Descriptors: *Sludge treatment, *Sludge disposal, Water purification, Separation techniques, *Water treatment, Filtration, *Dewatering, Waste Identifiers: *Sludge drying, *Sludge filtration, Polymer conditioning.

The disposal of sludges resulting from conventional water treatment processes such as coagula-tion, softening and filtration examined with a view of developing alternatives to disposal by dilution in cases where water quality stream standards would be violated or in situations where disposal to lagoons would be infeasible due to land costs. to lagoons would be infeasible due to land costs. Particular attention was given to the parameters of treatment plant operation and to sludge condition-ing techniques which result in rapid and thorough sludge dewatering on either open sand drying beds or through use of vacuum filters. The use of newly developed synthetic organic polyelectrolytes as a conditioning aid was investigated. Alternative methods of water treatment plant sludge disposal under varying conditions were evaluated. W73-01964

APPLICATIONS OF AGGLOMERATE TEST-ING TO PROBLEMS IN WATER RESOURCES MANAGEMENT, Wisconsin Univ., Madison. Water Resources

R. K. Ham, as Available free tion Service \$0.95 in micr Center, Madi fig, 12 tab, 1 0001-3050 14-

Descriptors: Mixing, *Tur *Water treats Identifiers: * Slow mix, Tu tion testing, *

Studies were lation testing jar-test was t tleability of fl brane refiltra developed to ses. Differen amined for the gradient pat For short set the step-up p glomeration indicate that bidity, the ra process of preliminary the effect of ica flocs to the return-flocs provements a the implicat generalized water and v (Kailash-Wis W73-01965

> E. COLI AS DISINFECT DITIONS, S. N. Cherki Ryabchenko Hygiene and Feb. 1971. 2

EFFECT OF FERENT CI MENTAL A

For primary W73-02020

Institute Moscow (US

Descriptors: *Public heal isms, *E. co Identifiers:

The value o respect to pends upon the water u the high res simple one. accurate da E. coli in w sions. (Bear W73-02085

EFFECT O ELECTRO (USSR)

R. K. Ham, and K. B. Gupta. Available from the National Technical Informa-tion Service as PB-213 178, \$3.00 in paper copy, \$0.95 in microffiche. Wisconsin Water Resources Center, Madison, Technical Report, 1972. 72 p. 32 fig, 12 tab, 10 ref. OWRR A-028-WIS (4). 14-01-001-3050 14-31-0001-3250 14-31-0001-3550.

Descriptors: *Coagulation, *Flocculation, Alum, Mixing, *Turbidity, Sludge, Recycling, Testing, *Water treatment, *Waste water treatment. Identifiers: *Velocity-gradient paths, Rapid mix, Sludge, Turbidity removal, Jar - tests, Coagulation testing, *Agglomeration (Turbidity).

Studies were conducted to evaluate several coagu-lation testing techniques. Of those considered, the jar-test was the most useful for evaluating the set-tleability of floculated suspensions, and the mem-brane refiltration test for evaluating filtrability of a brane relutration test for evanisting furrationary of a suspension. A jar-test procedure was then developed to provide more reproducible respon-ses. Different velocity-gradient paths were ex-amined for their effect on the overall efficiency of amined for their effect on the overall efficiency of the flocculation process. The tapered velocity gradient path provided the greatest turbidity removal for settling periods of 30 minutes or more. For short settling periods (e.g., 5 min.), however, the step-up path was particularly useful. The ef-fect of increased particle concentration on the ag-glomeration process was also studied. The results indicate that, with an increase in initial water tur-bidity, the rate of assetomeration and hence the indicate that, with an increase in initial water uni-bidity, the rate of agglomeration and, hence, the process of efficiency improved. Thereafter, preliminary studies were conducted to determine the effect of recycling previously formed alum-sil-ica flocs to the flocculation basin. The presence of ica nices to the Hocculation basin. The presence of return-flocs was found to produce significant improvements at low initial water turbidities. Finally, the implications of research findings on the generalized agglomeration process as used in water and wastewater treatment are discussed. (Kailash-Wisconsin) W73-01965

EFFECT OF DRINKING WATER WITH DIF-FERENT CHLORIDE CONTENTS ON EXPERI-MENTAL ANIMALS, (IN RUSSIAN), Institute of General and Municipal Hygiene,

Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-02020

E. COLI AS AN INDICATOR ORGANISM FOR DISINFECTION OF WATER WITH RESPECT TO ENTEROVIRUSES UNDER VARIOUS CON-

Akademiya Meditsinskikh Nauk SSSR. S. N. Cherkinskii, E. L. Lovtsevich, and V. A.

Hygiene and Sanitation, Vol 36, No 2, p 329-333, Feb. 1971. 2 fig. 19 ref.

Descriptors: Water treatment, Water quality, Public health, *Coliforms, *Viruses, Microorganisms, *E. coli, *Bioindicators, Disinfection.
Identifiers: *Enteroviruses.

The value of E. coli as an indicator organism with respect to the inactivation of enteroviruses depends upon the ratio of these microorganisms in the water undergoing disinfection. The problem of the high resistance of viruses in comparison with E. coli, and the possibility of using the latter as an indicator organism with respect to viruses, is not a simple one. Further investigations, based on more accurate data concerning the ratios of viruses and E. coli in water, will permit more reliable conclusions. (Bean-AWWARF) W73-02085

EFFECT OF DIETRY DEFICIENCY OF TRACE ELEMENTS (CU, MO, MN) ON WATER AND ELECTROLYTE METABOLISM, Pediatricheskii Meditsinskii Institut, Leningrad

For primary bibliographic entry see Field 05C. W73-02086

DISINFECTION OF DRINKING WATER CON-DISINFECTION OF DRINKING WATER CONTAINING ENTEROVIRUSES WITH ELECTROLYTIC PRODUCTS OF COMMON SALT, Akademiya Meditsinskikh Nauk SSSR. E. L. Lovtsevich, and L. A. Sergunina. Hygiene and Sanitation, Vol 33, No 9, p 334-341, Sept. 1968. 1 fig, 1 tab, 11 ref.

Descriptors: *Water treatment, *Public health, Disinfection, Coliforms, Viruses, Chlorination, Hydrogen ion concentration, Microorganisms, E. coli, Electrolysis, Potable water.

An experimental study was made of the dynamics of inactivation with the product of common salt electrolysis - 'an oxidant,' and with gaseous chlorine of attenuated and virulent strains of poliomyelitis virus, Coxsackie B-3 and A-7 viruses. Tests with coli and E. coliphage, in tap water at equal concentrations, showed that in water with pH 7.3 the inactivation proceeded 2-3 times faster and at lower levels of residual chlorine than in and at lower levels or resonant enforme than in water with pH 8.3. The decontaminating effect of 'the oxidant' did not differ to any significant ex-tent from the action of gaseous chlorine. The inac-tivation process of the investigated microorganisms was more intense when the water contained some amount of free residual chlorine besides the combined one. In all of the investigated conditions of water decontamination with 'the oxidant' the Bacillus coli was less resistant than the phage and the latter was less resistant than the virus. (Bean-AWWARF) W73-02089

STUDIES OF THE EFFECT OF DESALINATED DRINKING WATER ON THE FUNCTIONAL STATE OF THE ORGANISM, Ministerstvo Zdravookhraneniya SSSR, Moscow. G. I. Sidorenko, A. I. Bokina, V. K. Fadeeva, D.

A. Selidovkin, and K. S. Rozval. Hygiene and Sanitation, Vol 37, No 2, p 180-185, Feb 1971. 2 fig, 2 tab, 3 ref.

Descriptors: *Water treatment, Water quality, *Public health, *Desalination, Taste, Odor, Organoleptic properties.
Identifiers: *Mineralized water.

The drinking water of the town of Shevchenko, prepared by mixing sea water desalinated by evaporation with highly mineralized artesian water, possesses obnoxious organoleptic properties, namely, a brackish aftertaste and a specific odor, necessitating its treatment. The effects on man of the desalinated water with a continually varying saline composition, used for domestic purposes and drinking in Shevchenko, appear to be within the boundaries of the organism's compensatory capacities; the water does not produce any changes with respect to most indexes of water and electrolyte metabolism and renal and car-diovascular functions. Among inhabitants who had drunk the desalinated sea water for a prolonged period, there was a trend toward gastric hypoacidity. The monitoring of the drinking water in the course of its preparation should not be limited to its quality with respect to total salinity, but atten-tion should also be paid to conformance with the state standard (GOST) with respect to the concen-trations of sulfates and chlorides. (Bean-AW-WARF) W73-02091

ENVIRONMENTAL CONTROL ADMINISTRA-TION WATER HYGIENE PROGRAMS, Consumer Protection and Environmental Health Service, Washington, D.C. For primary bibliographic entry see Field 05G.

W73-02125

INFLUENCE OF STREAM QUALITY STAN-DARDS ON POTABLE QUALITY, NEED FOR

Camp, Dresser and McKee, Boston, Mass. For primary bibliographic entry see Field 05G. W73-02130

WATER DESALTING, PRESENT AND FU-

TURE, Stanford Univ., Palo Alto, Calif. For primary bibliographic entry see Field 03A. W73-02131

HYPOLIMNION AERATION, Texas Univ., Austin. Dept. of Civil Engineering.

R. E. Speece.

Journal of the American Water Works Association, Vol 63, No 1, p 6-9, January 1971, 5 fig, 10

Descriptors: *Hypolimnion, Thermal stratifica-tion, *Dissolved oxygen, Water quality, Reser-voirs, *Aeration, *Oxygenation.

Hypolimnion aeration is better than destratification for water-quality control in many stratified impoundments because it maintains cooler temperatures suitable to municipal and other uses and prevents excessive growth of algae. A modifica-tion of U-Tube aeration has been proposed along with two systems utilizing commercial oxygen. Deep oxygen-bubble injection is particularly favorable because the installation cost is low, the system is simple, and the oxygen absorption effi-ciency is high; and the cost of commercial oxygen is low. The cost per capita for hypolimnion aera-tion for four months' duration is estimated at about \$0.03. (Weir-AWWARF) W73-02137

ARTIFICIAL DESTRATIFICATION IN RESER. VOIRS.

American Water Works Association, New York. Quality Control in Reservoirs Committee. For primary bibliographic entry see Field 05G. W73-02138

ON THE USE OF RECLAIMED WASTE-WATERS AS A PUBLIC WATER-SUPPLY

American Water Works Association, New York. For primary bibliographic entry see Field 03C.

COMMUNITY WATER POLLUTION R AND D

American Water Works Association, New York. Committee on Pollution Parameters.
For primary bibliographic entry see Field 05G.
W73-02144

MAGNESIUM CARBONATE: A RECYCLED

COAGULANT - II, Thompson and Tuggle, Montgomery, Ala. C. G. Thompson, J. E. Singley, and A. P. Black. Journal of the American Water Works Association tion, Vol 64, No 2, p 93-99, February 1972, 11 fig. 4 tab. 12 ref.

Descriptors: *Coagulation, *Magnesium carbonate, *Magnesium hydroxide, *Electrophoresis, *Color, *Turbidity, Public health, Flocculation, Water purification, Water softening, Potable water, Corrosion control, Hardness (Water), Zeta water, Corrosin country, Flattness (Water), Zeta potential, Economic feasibility. Identifiers: *Coagulant recycling, Water stabilization, Flocculant aids, Alum.

Chemical treatment costs inherent in the magnesium carbonate water treatment process were evaluated. These costs were for lime, carbon dioxide,

Group 5F-Water Treatment and Quality Alteration

and make-up magnesium carbonate, and they were plotted as functions of coagulation pH and raw water alkalinity. Predictions of the required dosage of magnesium carbonate were based on experimental solubility relationships and on a linear regression correlation of data from seventeen natural waters studied. Of the independent variables in the correlation (color, turbidity, alkalinity, and hardness), color was by far the most significant in determining the minimum magnesium dosage. Treatment efficiency was correlated with electrophoretic mobility which showed a more significant correlation of mobility with color removal than with turbidity removal. Photomicrographs of alum and magnesium floc appeared to be more dense with concentrated areas of color compared to alum, which appeared filamentous with the organic color dispersed. A description of the application of this new process is given with a flow diaganic color dispersed. A description of the applica-tion of this new process is given with a flow dia-gram of a turbidity removal plant using MgCO3 and lime recalcining. (See also W72-05804) (Nichols-AWWARF) W73-02145

HIGH RATE FILTRATION IN FAIRFAX COUN-

TY, VIRGINIA,
Fairfax County Water Authority, Annandale, Va.

F. F. Eunpu. Journal of the American Water Works Associa-tion, Vol 62, No 6, p 340-345, June 1970. 4 fig, 8

Descriptors: *Filtration, *Filters, *Settling basins, Water purification, Turbidity, Porous media, Public health, *Virginia, *Water treatment, *Treatment facilities.

Identifiers: *Tube settlers, *High-rate filtration, *High-rate settlers, Upflow clarifiers, Dorr Hydro-Treater, Micro-Floc media, Turbidimeters, Fairfax County (Va).

The Fairfax County Water Authority desired to increase the capacity of the River Station Treatment Plant by a factor of 2.5, corresponding to an increase in filtration rate from 2.0 to 5.0 gpm/sq. ft. Experiments were undertaken to improve sedimentation by using tube settlers arranged around mentation by using tube settlers arranged around the outer periphery of the circular settling area. Various arrangements of tube settlers were tried with results tabulated for each arrangement. Best results were obtained with a double layer of tube-settler modules with a vertical gap between them. This arrangement resulted in filtered water turbidities of 0.04 fut at a 5.0 gm/sq. ft. loading rate. This performance compared favorably with results obtained at 2.0 gpm/sq. ft. ton the same treatment unit (Dorr Hydro-Treater) without tube settlers. Micro-Floc media, consisting of ilmenite, sand, and coal, inversely graded, was used with the tube settlers. One conclusion was that the existing filter media—consisting of-sand and anthrafil was adequate and compared favorably with results achieved to date compared favorably with results achieved to date with the Micro-Floc media. (Nichols-AWWARF)

EFFECT OF LIME-TREATED WATER UPON SURVIVAL OF BACTERIA, Ohio Dept. of Health Labs., Columbus.

M. L. Riehl, H. H. Weiser, and B. T. Rheins.

Journal of the American Water Works Association, Vol 44, No 5, p 466-470, May 1952. 4 fig. 4

Descriptors: *Bactericides, *Lime, *Disinfection, Bacteria, E. coli, Salmonella, Cultures, Public Health, Water purification, *Water treatment. Identifiers: *Lime-treated water, Waterborne dis-

Experimental work showed that E. coli, S. typhosa, and S. Montivideo do not survive for prolonged periods in water when high pH levels are maintained by the addition of excess lime. At a pH range from 11.0 to 11.5, a temperature of 15C, and

a holding period of slightly longer than 4 hr., this method was effective in destroying many of the test organisms. Freshly isolated strains of the test bacteria were more resistant than the same species propagated for several months on culture media. The composition of the water did not influence appreciably the survival of the organisms when a high pH level was maintained. The experimental procedure involved addition of 1000 organisms per ml of water sample followed by addition of varying amounts of calcium hydroxide to each sample except the control. The samples were mixed rapidly for 5 min. and then slowly for 2 hr. Each series of water samples was incubated at 5, 15, and 25C, followed by bacterial counts at varying time intervals up to 10 hr. and in some cases 100 hr. Several graphs are shown plotting per cent survival vs time for varying pH, temperature, and water quality conditions. (Nichols-AWWARF)

DESIGN-OPERATION INTERACTIONS FOR WASTEWATER TREATMENT PLANTS, Clemson Univ., S.C. Dept. of Environmental Systems Engineering. J. F. Andrews.

Water Research, Vol 6, No 6, p 319-322, June

Descriptors: "Waste water treatment, "Planning, Design criteria, "Treatment facilities, "Opera-tions, Personnel. Identifiers: "Plant design.

Widespread operation and maintenance problems have resulted in inefficient waste treatment plant operations. A proper balance between design and operation should be established in order to eliminate the problems resulting from lack of qualified operating personnel, inadequate controls over industrial wastes, inadequate plant design, or lack of adequate equipment. Operating personnel, process stability, availability of space, reliability, financial considerations, and design flexibility are discussed. Some problems associated with large treatment plants and shortcomings in existing research and educational programs are described. (Morparia-Texas) (Morparia-Texas) W73-02209

DESIGN CONSIDERATIONS FOR LARGE

TREATMENT PLANTS.
Institut fuer Wasserversorgung, Vienna (Austria).
For primary bibliographic entry see Field 05D. W73-02213

WHAT'S SO GREAT ABOUT MGCO3, Thompson and Tuggle, Montgomery, Ala. C. G. Thompson, C. Yeary, J. Colyer, and A. P.

Water and Wastes Engineering, Vol 9, No 8, p 41-44, August 1972. 1 fig, 2 tab.

Descriptors: *Magnesium carbonate, Magnesium hydroxide, Calcium carbonate, "Water treatment, *Cost analysis, Cost comparison, *Florida. Identifiers: *Water hardness, *Melbourne

A familiar problem of increasing hardness, al-kalinity, taste, odor, and treatment costs is forcing the city of Melbourne Florida to adopt MgCO3 coagulation for water treatment. Sufficient lime slurry is added to water containing magnesium carbonate, precipitating magnesium hydroxide and calcium carbonate. Magnesium hydroxide has similar properties to aluminum hydroxide except for faster settling rates and easier dewatering. This study was divided into five phases: jar tests, 55 gallon barrel tests, sludge recovery studies, potassium permanganate demand studies, and settling studies. The jar test determined optimum dosages of lime, MgCO3, flocculant, and pH. The barrel test determined that complete MgCO3 coagulant A familiar problem of increasing hardness, alrecovery can be obtained from recarbonation of the sludge. In order to settle 99.9% of the floc, studies showed that Mg (OHI) required 18 minutes as opposed to 45 minutes for alum flocs. Therefore, the existing clarifier has potential to be loaded at twice its present rate. Calculated treatment cost figures and comparative coagulant cost figures are presented. A full-scale study is planned for the near future. (Anderson-Texas)

LEADING CREEK CONSERVANCY DISTRICT (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Economic Development Administration, Chicago, Ill. Midwestern Region.

Available from National Technical Information Service as EIS-OH-72-4802-F, \$9.00 in paper copy, \$0.95 in microfiche. June 29, 1972. 126 p, 5 fig, 10 map, 8 photo, 18 tab, 1 append.

Descriptors: "Water supply development, "Water management (Applied), "Ohio, "Environmental effects, Water resources, Water supply, Water yield, "Water treatment, Wells, Water takers, Water storage, Water pollution, Water utilization, Water distribution (Applied), Water demand, Municipal water, Industrial water, Mine water, Mine wastes, Water resources development, Watershed management.

management. Benvironmental Impact Statements, *Meigs County (Ohio), *Leading Creek Conservancy District.

The proposed project in Meigs, Vinton and Gallia counties, Ohio, is a rural water system to supply potable water to rural residential customers, commercial establishments, schools, villages, several mercial establishments, schools, villages, several industrial areas and two recreation sites in the Leading Creek Conservancy District. Untreated water will be provided for several industrial sites. The system will consist of wells, pumping equipment, raw water and treated water storage tanks, and distribution trunk lines for domestic, commercial industrial and recent consumers. and distribution trunk lines for domestic, commer-ical, industrial and recreational purposes. Approx-imately 250 million gallons of water will be used per year, mostly by residential users. Adverse en-vironmental effects resulting directly from the construction and operation of the water system in-clude minor temporary disturbance. More signifi-cant environmental effects will result indirectly due to the extraction of coal to fuel the Gavin Power Facility. Adverse environmental effects resulting from the use of the water by industrial customers include creation of solid mine waste customers include creation of solid mine waste and liquid coal waste, generation of sanitary wastes, alteration of land-forms, and use of fossil fuel reserves. Alternatives are to proceed with the proposed project or to abandon the project. (Wheeler-Florida) W73-02267

WASTEWATER TREATMENT WORKS PLANNING, ECONOMICS AND TECHNOLO-GY-SOME NEW DIRECTIONS, Environmental Protection Agency, Washington, D.C. Office of Water Programs. For primary bibliographic entry see Field 05D. W73-02296

THE ANALYTICAL CONTROL OF ANTI-CO-THE ANALYTICAL CONTROL OF ANTI-CO-RROSION WATER TREATMENT, California Univ., Berkeley. W. F. Langelier. Journal of the American Water Works Assocition,

Vol 28, No 10, p 1500-1520, October, 1936. 2 fig, 8

Descriptors: *Corrosion control, Water softening, Water treatment, *Analytical techniques, Mathematical studies, Chemical Analysis, Chemical precipitation, Alkalinity, Temperature control, *New York. Identifiers: *Inc cal equilibrium,

Certain chemics tion of oxygen-iron or galvania of a general equation of a general equation of a general equation of the second of the softening, lime alum, contact v soda or lime, e discussed and shown to corre six-year study New York NWWA) W73-02411

ON THE SIGN ENDEMIC GO Meditsinskii In L. I. Belyaev, ar Hygiene and S Aug. 1969, 4 ref

Descriptors: * Toxins, Disease Identifiers: * glands.

Urochrome, a urine, is a dis precise structu cited indicating dung. However thyroid glands treated with u terations char results suggest have an effect assess the post example its je agents conta agents contains products. Uro lated with the integration of WARF) W73-02425

KENOSHA I WITH MICRO Kenosha Wate O. F. Nelson. Water Works 7, p 43-46, July

Descriptors: 4 Sands, Lake 1 tration, Water Treatment fac Identifiers: *S ing, *Microstr

The installati other treatme treatment pla runs, 46 to 97 increase in pl and odor prot mately \$1.50 when the plan day. (Flack-A W73-02426

SOME STUD OF CADMIU UM IN DRIN Michigan St Chemical Lal

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Water Quality Control-Group 5G

Identifiers: *Incrustation, pH adjustment, Chemical equilibrium, Water conditioning.

Certain chemical relationships involved in the action of oxygen-containing waters on the interior of iron or galvanized pipe are discussed. Derivation of a general equation for pH sub 8, provision for total salinity or ionic strength, salinity and temperature effects in pipe protection, the Saturation Index, and pH adjustment are treated. The effects of various forms of water conditioning, i.e., zeolite softening, ime-soda softening, coagulation with alum, contact with limestone, dosing with caustic soda or lime, etc., upon the Saturation Index are discussed and examples are given. The Index is shown to correlate with the published results of a six-year study of interior pipe corroxion by the New York Water Department. (Campbell-NWWA) New Yor NWWA) W73-02411

ON THE SIGNIFICANCE OF UROCHROME IN ENDEMIC GOITER, Meditsinskii Institut, Gorkii (USSR), Dept. of Hy-

I.I. Belyaev, and L. A. Pal'mova. Hygiene and Sanitation, Vol 34, No 8, p 154-157, Aug. 1969, 4 ref.

Descriptors: *Water treatment, *Public health, Toxins, Diseases, Water pollution affects. Identifiers: *Goiter, *Urochrome, *Thyroid

Urochrome, a pigment found in the feces and urine, is a dissociation product of hemetin. Its precise structure is unknown. Published data are cited indicating that goiter may be developed in animals by supplying water polluted by liquid dung. However, histological investigation of the dung. However, instongical investigation of the thyroid glands of experimental rats and rabbits, treated with urochrome, found no structural alterations characteristic of endemic goiter. The results suggest that urochrome does not by itself have an effect of this sort. It is not yet possible to nave an effect of this sort. It is not yet possible to assess the possibility that urochrome may produce goiter when combined with other factors, as for example its joint action with other synergetical agents contained in urofaecal contamination products. Urochrome content in water was correlated with the presence of other indices of the disintegration of organic substances. (Bean-AW-WARF)
W73-02425

KENOSHA INCREASES PLANT CAPACITY WITH MICROSTRAINERS, Kenosha Water Dept., Wis. O. F. Nelson.

Water Works and Wastes Engineering, Vol 2, No 7, p 43-46, July 1965, 3 fig, 1 tab.

Descriptors: "Water treatment, "Algae, "Filters, Sands, Lake Michigan, Water quality control, Fil-tration, Water purification, Membranes, Screens, Treatment facilities, "Wisconsin. Identifiers: "Screening, "Kenosha (Wis), "Strain-

ing, *Microstrainers.

The installation of microstrainers ahead of all other treatment at the Kenosha, Wisconsin water other treatment at the Kenosha, Wisconsin water treatment plant has resulted in extended filter runs, 46 to 97 percent removal of algae, 25 percent increase in plant capacity and elimination of taste and odor problems. The process costs are approximately \$1.50 per million gallons of water treated when the plant is processing 12 million gallons per day. (Flack-AWWARF) W73-02426

SOME STUDIES ON THE CHRONIC TOXICITY OF CADMIUM AND HEXAVALENT CHROMIUM IN DRINKING WATER, Michigan State Univ. East Lansing. Kedzie

For primary bibliographic entry see Field 05C. W73-02428

THE EFFECTS ON MAN OF LOW CONCENTRATIONS OF URANIUM,
Nauchno-Issledovatelskii Institut Gigieny,
Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-02429

WATER QUALITY CHANGES IN THE DISTRIBUTION SYSTEM, Mississippi State Univ., State College. Dept. of Civil Engineering. A. Shindala, and C. H. Chisholm. Water and Water Reciprocine.

Water and Wastes Engineering, Vol 62, No 1, p 35-37, January 1970, 2 fig, 2 tab.

Descriptors: *Distribution systems, *Water quali-ty, Corrosion, Bacteria, Turbidity, Chlorine, Microorganisms, Taste, Odor, Treatment facili-ties, Hydrogen ion concentration, Iron bacteria, Alkalinity, Hardness (Water), Dissolved oxygen, Manganese, Iron. Identifiers: EDTA hardness, Tuberculation.

Quality water leaving the treatment plants deteriorates as it moves through the distribution system, due to corrosion, tuberculation, and bacterial activity. Such activities could result in turbid water, tivity. Such activities could result in turbu water, loss of chlorine residual, organism growth, and taste and odors. The results of a prototype study of water quality changes in a distribution system and its relation to the source are presented. The study was conducted in Jackson, Mississippi, study was conducted in Jackson, Mississippi, utilizing distribution system components where periodic complaints occurred. Schematic diagrams for both the treatment and the distribution system selected are given. Parameters studied include: pH, total alkalinity, EDTA hardness, total pH, total alkalimity, EDTA hardness, total chlorine, dissolved oxygen, manganese, total iron hardness, and iron bacteria. Samples were collected from treatment plant effluent and fire hydrants. Tabulated results show that during low flow periods iron, manganese, and slime could be deposited in the distribution system. These deposits would slough off during high flows and appear at the consumer's tap. Regular flushing of the distribution system helps to reduce this problem. (Andrews-AWWARF) W73-02430

METHODOLOGY IN ESTABLISHING WATER QUALITY STANDARDS, Washington Univ., Seattle

For primary bibliographic entry see Field 05G. W73-02536

ANION EXCHANGE AND FILTRATION TECHNIQUES FOR WASTEWATER RENOVA-

Stanford Univ., Calif. Dept. of Civil Engineering. For primary bibliographic entry see Field 05D. W73-02537

EXPERIENCES WITH WASTEWATER DISIN-PECTION IN CALIFORNIA,
California State Dept. of Public Health, Sacramen-

For primary bibliographic entry see Field 05D. W73-02539

5G. Water Quality Control

ECONOMIC ANALYSES OF OPTIMAL WATER ECONOMIC ANALYSES OF OPTIMAL WATER QUALITY MANAGEMENT, Purdue Univ., Lafayette, Ind. Water Resources Research Center. A. B. Whinston. Available from the National Technical Informa-tion Service as PB-213 171, \$3.00 in paper copy,

\$0.95 in microfiche. Indiana Water Resources Research Center, Lafayette, Technical Report No. 25, August 1972. 276 p, 34 fig, 14 tab, 105 ref, 2 append. OWRR B-020-IND (20).

Descriptors: "Regional development, "Optimiza-tion, "Water quality standards, "Treatment facili-ties, "Linear programming, "Costs, "Economics of scale, Cost allocation, Regional economics, Taxes, River basin development, Model studies, Ledica-Identifiers: Non-linear programming, *West Fork

A technique for mathematical programming is used to select a least-cost combination of water used to select a least-cost combination of water treatment strategics in a river basin. The model conforms to the constraints of minimizing treatment costs subject to specified quality goal standards. Such subjects as a model for a private environmental agency; cost allocation for a regional pollution treatment system; environmental resources allocation; planning for pollution control; taxation and water pollution control; and the trol; taxation and water pollution control; and the allocation of troubleome material are discussed. A strong case is made for treating water pollution as a regional or basin-wide problem instead of imposing discharge limitation and deciding on the construction of treatment plants on an ad hoc basis. Once a regional approach is being considered other treatment strategies may also be evaluated alongside treatment at polluters. A nonlinear programming model presented deals with the problems of collection and organization of data to determine water quality implied by alternative treatment strategies, and the isolation of efficient solutions to satisfy the given quality goals. W73-01951

SURFACE WATERS OF A SMALL CITY (SPRINGFIELD, MASS), Springfield Coll., Mass. For primary bibliographic entry see Field 06G. W73-01961

ASSESSMENT OF TURBIDITY, COLOR, AND ODOR IN WATER,

Anacapa Sciences, Inc., Santa Barbara, Calif. D. H. Harris.

Available from the National Technical Informaton Service as PB-213 180, \$3.00 in paper copy, \$0.95 in microfiche. Technical Report 128, August 1972, 47 p, 9 fig, 6 tab, 16 ref. OWRR C-3064 (No 3680) (1).

Descriptors: "Water quality standards, Quality control, "Turbidity, "Odor, "Color, "Water demand, Water quality control. Identifiers: "Water acceptability, "Water measurement systems, "Human factors, "Physical characteristics, "Measurement variability.

This study was directed toward a fundamental problem of water resources management-matching the control of water quality against public acceptance of the water. Commonly systems for measuring turbidity, color, and odor were identified and their reliability tested; com-binations of turbidity, color, and odor values were related to public acceptability of water, throughout the full range of acceptability. The most commonly used systems were found to be: the nephelometric system for turbidity measurethe nephetometric system for turbulity measurement, the color measurement system employing an optical device for visual matching, and the Threshold Odor Number method for odor measurement. In a substantial percentage of cases, however, systematic methods were not used. however, systematic methods were not used. These measurement systems were found lacking in reliability and found to be least reliable at the smaller values of turbidity, color, and odor, those values where most measurement and decision making take place. Acceptability percentages were obtained from a total of 540 raters, and mapped for each of 125 combinations of turbidity, color, and

Group 5G-Water Quality Control

odor values. The end product was a set of charts that can be used to obtain the water acceptability associated with any combination of color, turbidity, and odor. W73-01971

ESTUARIES, BAYS AND COASTAL CURRENTS AROUND PURRTO RICO, Puerto Rico Univ., Mayaguez. Water Resources

Research Inst. For primary bibliographic entry see Field 05B. W73-01974

WATER QUALITY MANAGEMENT, AN ANALYSIS OF INSTITUTIONAL PATTERNS, lowa Univ., Iowa City. Dept. of Urban and Regional Planning.
D. C. Ranney.
University of Wisconsin Press, Madison, 1972. 158

p. 6 fig. 6 tab. 212 ref. OWRR A-999-WIS (16).

Descriptors: *Wisconsin, *Water quality control, Descriptors: "Wisconsin, "Water quality control, "Systems analysis, "Administrative agencies, Statistical models, Institutions, Regional analysis, Regional development, River basins, River systems, State governments, Political aspects, Model studies, Research and development, Political constraints, Local governments, Water quality, Administrative decisions, Adoption of practices, Decision making.

The existing regulatory approach to water quality management is contrasted with the alternative of a systems approach for the Wisconsin River Basin in this study. Alternative institutional frameworks for operating a systems approach are also considered. The purpose is to develop an approach to institutional design from an administrative-political perspective for a better utilization of existing water management technology. The first part of the study describes the existing political-administrative system. The first two chapters discuss the sources of demands for water quality in the Wisconsin River Basin and how these demands are articulated. Local government, the economy and attitudes are considered. Chapter three examines the formal structure of the institutions that administer water quality management programs in minister water quality management programs in Wisconsin. Chapter four uses two case studies of conflicts over water quality questions in Wisconsin to stress political aspects of water quality management. The second part of the report, comprised of two chapters, explores an alternative approach, the regional system, and evaluates three alternative institutional arrangements: The status quo model, the Two Agency Model, and the in-terorganizational model. (Nielsen-Florida) W73-01978

ADMINISTERING STATE RESOURCES: THE NEED FOR LONG RANGE bibliographic entry see Field 06E. For primar W73-01979

PROPOSED RECLASSIFICATIONS OF CERTAIN WATERS IN THE CAPE FEAR, LUMBER, AND VADKIN, PEE DEE RIVER RASINS TO RE AND YADKIN-PEE DEE KIVER BASINS TO BE CONSIDERED AT A PUBLIC HEARING TO BE HELD ON NOVEMBER 2, 1972, IN SOUTHERN PINES, NORTH CAROLINA.

North Carolina Board of Water and Air Resources, Raleigh. Water and Air Quality Control Committee.

(1972), 28 p. 3 tab.

Descriptors: *North Carolina, *Water quality standards, *Streams, *Classification, Water supply, Degradation (Stream), Administrative agencies, Water treatment, Water purification, Swimming, Fish, Wildhife, Agriculture, Tidal streams, Water policy, Water utilization, Con-

sumptive use, Conjunctive use, Water resources, Standards.

Certain specified streams or segments of streams in the Yadkin-Pee Dee, Lumber and Cape Fear River Basins located in North Carolina were proposed for reclassification. The proposals were to be considered at a public hearing before a committee of the State Board of Water and Air mittee of the State Board of Water and Air Resources. The proposed classification changes involved waters in 43 counties in the state. Fresh waters were divided into five classes. First was that suitable as water supply for drinking, culinary or food processing purposes after disinfection treatment. The second class included water used for similar purposes but requiring treatment equal to coagulation, sedimentation, filtration and disinfection. The third class was suitable for outdoor bathing. The fourth class was suitable for outdoor bathing. The fourth class was suitable for griculture, industrial cooling, navigation and process water supply. Tidal salt waters were divided into three classes. Tables were included naming the stream, describing it, listing the existing class, describing the proposed segment and giving the proposed class. (Neilsen-Florida)

REPAIR AND PROTECT OUR NATURAL EN-

VIRONMENT, House, Washington, D. C. For primary bibliographic entry see Field 06E. W73-01993

W73-01997

THE EFFECT OF FERTILIZERS ON SEED PRODUCTION OF IRRIGATED ALFALFA. (IN UKRAINIAN),
For primary bibliographic entry see Field 03F.

EFFECT OF MINERAL FERTILIZERS AND IR-RIGATION ON THE YIELDS OF BASIC CROPS, (IN RUSSIAN), For primary bibliographic entry see Field 03F. W73-02007.

POLLUTION OF SUBSURFACE WATER BY SANITARY LANDFILLS. VOL 2, Drexel Univ., Philadelphia, Pa. For primary bibliographic entry see Field 05B. W73-02106

POLLUTION OF SURFACE WATER BY SANI-TARY LANDFILLS. VOL 3, Drexel Univ., Philadelphia, Pa. For primary bibliographic entry see Field 05B. W73-02107

THE EFFECTS OF SEWER SURCHARGES ON THE LEVEL OF INDUSTRIAL WASTES AND THE USE OF WATER BY INDUSTRY, North Carolina Water Resources Research Inst.,

Raleagn.
R.D. Elliott, and J. A. Seagraves.
Available from the National Technical Information Service as PB-213 267, \$3.00 in paper copy,
\$0.95 in microfiche. UNC-WRRI North Carolina Water Resources Research Institute Report No. 70, August 1972. 53 p, 7 fig, 4 tab, append. OWRR B-032-NC (7) 14-31-0001-3317.

Descriptors: Water pollution control, *Industrial wastes, *Municipal wastes, *Elasticity of demand, Economics, Effluents, Prices, Water demand. Identifiers: *Surcharge, *Effluent charges, *Economic incentive, Waste treatment demand.

This study is directed at helping cities make decisions about industrial waste surcharges by estimat-ing their effect on industrial wastes discharged into municipal systems and on the quantity of water demanded from municipal systems by industrial firms. The gains to society that are possible with the introduction of surcharges are also estimated. Multiple regression equations were specified for estimating elasticities of demand. 198 time-series observations were obtained from 34 cities in the United States. Data substantiate the negative relations hypothesized among these prices and quantities. Surcharges do cause a reduction in industrial wastes, and the cities with high surcharges on BOD have less industrial biodegradable waste to treat than those with low surcharges. Surcharges on wastes also cause a reduction in the industrial use of water. Available evidence also supports the conclusion that cities which charge the most for water sell less water to industry per \$1000 value added in manufacturing and receive fewer pounds of waste from industry. W73-02115

THE INFLUENCE OF THE NEW ENGLAND WETLAND ON WATER QUANTITY AND QUALITY, New Hampshire Univ., Durham. Water Resources

New Hampshire Univ., Durnam. Water Resou Research Center. For primary bibliographic entry see Field 02D. W73-02116

EFFECTS OF LONG CHAIN POLYMERS ON THE SIZE DISTRIBUTION OF OIL-IN-WATER EMULSIONS, Brown Univ., Providence, R.I. Div. of Engineer-

Available from the National Technical Information Service as PB-213 270, \$3.00 in paper copy, \$0.95 in microfiche. Rhode Island Water Resources Center Completion Report, 1972. 30 p, 21 fig., 9 ref. OWRR A.-043-RI (1) 14-31-0001-3540.

Descriptors: Oil water, Water pollution control, *Polymers, *Separation techniques, *Oil-water in terfaces, *Emulsions, Turbulence.

The effects of long chain, turbulent drag reducing polymers on oil-in-water emulstions were studied using the Counter Counter. Both 50 ppm polyethylene oxide and 500 ppm Separan MGL proved to reduce particle counts while 500 ppm polyethylene oxide had the adverse effect of increasing the density. Solutions of 4.4% polyisoburylene in cetane and 50 ppm Separan MGL had no noticeable effect on the size distribution. The inflection point diagrater could not be found in each nourcease effect on the size distribution. The in-flection point diameter could not be found in each emulsion. Therefore it was recommended that fu-ture testing be continued investigating smaller par-ticles through the use of a 30 micron aperture tube. W73-02120

NUTRIENT REMOVAL BY WATER-HYACINTH. Auburn Univ., Ala. Dept. of Botany and Microbiology. microtototogy. H. H. Rogers, and D. E. Davis. Weed Science, Vol. 20, No. 5, pp. 423-428, Sep-tember 1972. 9 fig. 2 tab. OWRR A-019-ALA (2) 14-31-0001-3201.

Descriptors: *Water hyacinth, *Nitrogen, *Phosphorus, *Nutrient removal, *Aquatic weeds, *Eutrophication, *Nutrients, Water purification, Water pollution control. Identifiers: *Eichhornia crassipes.

Removal of nitrogen and phosphorus by water-hyacinth (Eichhornia crassipes (Mart.) Solms) in hyacinth (Bichhornia crassipes (Mart.) Solms) in static and flowing water was investigated. Milligrams of phosphorus absorbed per plant per day in static water averaged 1.1, 2.1, 3.1 and 1.6 in 10, 25, and 50% Hoagland's solution and in sewage effluent, respectively, while in flowing water the values were 1.7, 2.5 and 3.3 for 10, 25, and 50% Hoagland's solution. Milligrams of nitrogen absorbed per plant per day from these same solutions averaged 5.3, 1, and 9.9, 18.4 an piration per pla-175 ml in static One hectare of timum condition nitrogen and ph 800 people. (See W73-02122

ENVIRONMEN TION WATER Service, Washi C. A. Hansen. Journal of the tion, Vol 61, N

Descriptors: *1
ty standards, I eases, Water p Wastes, Huma Identifiers: *E tion, Safe Drin

In 1967, 50 mil at did not m little has been Environmenta cerned about the population areas, the con diseases from stream of nev concerned be tification of v has serious de rected by dev better inform and new legis (Walker-AWV W73-02125

RESEARCH DEVELOPMI American Wa Committee o Water Supply For primary b W73-02126

MANAGER'S ING PROCES
Philadelphia
For primary b
W73-02127

INFLUENCE DARDS ON STANDARDS Camp, Dress R. H. Culver. Journal of the tion, Vol 60,

Descriptors: quality conti ment, Disinf Turbidity, Co

lation p Population p tion of all wa water will ha possible for the best vail Standards for area should of this high quality are u ways treats (Walker-AW

WATER QUALITY MANAGEMENT AND PROTECTION-Field 05

Water Quality Control-Group 5G

averaged 5.3, 11.4, 19.8 and 6.6 from static water and 9.9, 18.4 and 20.8 from flowing water. Transpiration per plant per day averaged approximately 175 ml in static water and 225 ml in flowing water. One hectare of water

ENVIRONMENTAL CONTROL ADMINISTRA-TION WATER HYGIENE PROGRAMS, Consumer Protection and Environmental Health Service, Washington, D.C.

C. A. Hansen.

Journal of the American Water Works Association, Vol 61, No 10, p 522-524, October 1969.

Descriptors: *Water quality control, *Water quali-ty standards, Impaired water quality, Human dis-eases, Water pollution, Potable water, Salmonella, Wastes, Human population, Pollutants, Legisla-

tion.

Identifiers: *Environmental Control Administra-tion, Safe Drinking Water Act of 1968.

In 1967, 50 million Americans were drinking water that did not meet USPHS drinking standards and little has been done to correct this situation. The Environmental Control Administration is concerned about the problem for four main reasons: the population growth and concentration in urban the population grown and concentration in urban areas, the continuing outbreaks of communicable diseases from contamination of water supplies, the stream of new and unidentifiable contaminants, and the need for reclaimed waste. The ECA is also concerned because the USPHS program for certification of water supplies by interstate carriers has serious deficiencies. The situation can be corrected by development of more meaningful stanrected by development of more meaningful standards for drinking water, a greater research effort, better information for evaluating water supplies and new legislation to maintain high water quality. (Walker-A WWARF)

RESEARCH NEEDED ON AVAILABILITY AND DEVELOPMENT OF WATER SUPPLY.
American Water Works Association, New York.
Committee on Availability and Development of

Water Supply.
For primary bibliographic entry see Field 06B.
W73-02126

MANAGER'S ROLE IN THE DECISION MAK-

ING PROCESS, Philadelphia Water Dept., Pa. For primary bibliographic entry see Field 06B. W73-02127

INFLUENCE OF STREAM QUALITY STAN-DARDS ON POTABLE QUALITY, NEED FOR STANDARDS, Camp, Dresser and McKee, Boston, Mass. R. H. Culver.

Journal of the American Water Works Associa-tion, Vol 60, No 1, p 5-9, Jaunary 1968.

Descriptors: *Water quality standards, *Water quality control, Water purification, Water treatment, Disinfection, Coagulation, Waste disposal, Turbidity, Coliforms, Pollutants.

Population pressures require the maximum utiliza-Population pressures require the maximum utiliza-tion of all water resources. This means that waste water will have to be treated to the highest degree possible for all uses. Water should be taken from the best vailable source and exceed the USPHS Standards for Drinking Water. Economics of each area should dictate the means of treatment to meet this high quality standard. Criteria for raw water quality are unnecessary if each plant operator al-ways treats his water as if it were highly polluted. (Walker-AWWARF)

W73-02130

ON THE RECREATIONAL USE OF DOMESTIC WATER SUPPLY RESERVOIRS. American Water Works Association, New York

Journal of the American Water Works Association, Vol 63, No 8, p 540, August 1971.

Descriptors: *Water policy, *Water supply, *Recreation demand, Impoundments, Swimming, Water quality, Water utilization.

The American Water Works Association supports the principle that water of the highest quality should be used as a source of supply for public water systems. Since each water utility is responsiwater systems. Since each water utility is responsible for its product, determination of the type and extent of recreational use of impounding reservoirs (whose water receives treatment before consumption) shall be vested in the water utility. The decision concerning recreation should be based on: state and local laws and regulations, information provided by research organizations, and an assessment of public need for future utilization of water resources. (Walker-AWWARF)

MONITORING NEW YORK'S WATER AUTO-

MATICALLY, New York State Dept. of Environmental Conservation, Albany. Water Quality Surveillance Sec-

Journal of the American Water Works Associa-tion, Vol 63, No 8, p 517-522, August 1971, 7 fig.

Descriptors: *Water quality control, *Monitoring, *Data collections, Data transmission, Instrumentation, Telemetry, *New York, Computers.

New York State's water quality surveillance program estimates the biological, physical, radiological, and chemical characteristics of the state's waters. Automatic monitors are currently located at 12 of the 200 surface-water-quality stations. The system consists of major monitors, minor moni system consists of major monitors, minor monitors, attellite monitors, the computer center, remote terminals, and the telecommunications system. The major monitors were installed for \$30,000 each plus \$10,000 each for telemetry equipment. Operation and maintenance costs in the first year averaged \$7,000 per monitor. The me IIIst year averaged \$7,000 per monitor. The telecommunications system is operating at an efficiency approaching 98 percent. The entire system operates at approximately 85 percent efficiency. (Weir-AWWARF) W73-02135

HYPOLIMNION AERATION, Texas Univ., Austin. Dept. of Civil Engineerin For primary bibliographic entry see Field 05F. W73-0213

ARTIFICIAL DESTRATIFICATION IN RESER-

American Water Works Association, New York.

Journal of the American Water Works Association, Vol 63, No 9, p 597-604, September 1971. 4 fig, 3 tab, 19 ref.

Descriptors: *Thermal stratification, *Taste, *Odor, Dissolved solids, Algae, Reservoir storage, *Hypolimnion, Water quality control. Identifiers: *Mixers.

The Quality Control in Reservoirs Committee of the American Water Works Association con-ducted a study of water purveyors using artificial destratification techniques to overcome tastes and odors; high concentrations of iron, manganese, and hydrogen sulfide; and algae difficulties as-

sociated with anaerobic conditions in the hypolimnion layer in reservoirs. A high rate of success from both homemade and commercial mixing ap-paratus was recorded with an estimated initial cost per unit volume of \$3/mil gal and an operating cost of \$0.45/mil gal/yr for a 10,000 acre-ft. reservoir. More study is needed to evaluate the various types of apparatus, the actual changes in water quality, and the influence of artificial destratification on indicator organisms and enteric pathogens. (Weir-AWWARF) W73-02138

WATER FOR INDUSTRIAL NEEDS: WHAT,

WHERE, WHEN,
Ford Motor Co., Detroit, Mich. Environmental
Control Section.
For primary bibliographic entry see Field 03E.
W73-02139

COMMUNITY WATER POLLUTION R AND D

American Water Works Association, New York. Committee on Pollution Parameters.

Journal of the American Water Works Association, Vol 64, No 4, p 211-215, April 1972, 9 ref.

Descriptors: *Water purification, *Water pollution treatment, *Public health, Analytical techniques, waste water treatment, Taste, Odor, Potable water, Activated carbon, Coliforms, Viruses, Crustaceans, Nematodes, Epidemiology, Phosphates, Heavy metals, Pesticides, Tasteproducing algae, Odor-producing algae, Actinomycetes, Phosphates.

Identifiers: *Waterborne diseases, *Toxic chemicals, *Public health standards, Toxicology, NTA.

The Pollution Parameters Committee of the AWWA has prepared a report on the current state of the art in the field of antipollution measures and has set forth its research recommendations. Among the water quality parameters discussed are coliform bacteria, viruses, tastes and odors, phosphates, NTA, and other organic and inorganic chemicals. The research needs recommended by the committee include (1) identification of all pollutants presenting a potential health hazard as well as those responsible for obnoxious tastes and odors; (2) increasing the sensitivity, precision, and rapidity of both microbiological and chemical techniques for examining wastewater; (3) tox-icological research and epidemiological studies that correlate morbidity data with specific characteristics of the water; (4) laboratory research and pilot-plant studies to develop and evaluate processes that will continuously treat directly reused municipal wastewaters to produce 'safe and satisfactory' drinking water. (Nichols-AW-WARF) W73-02144

ALTERNATIVES FOR FLUORIDATION OF

AQUEDUCTS (IN ITALIAN), Rome Univ. (Italy). Instituto di Clinica Odontoiatrica.

G. Grippaudo, and G. Gallusi.

Ann Stomatol. Vol 20, No 5, p 153-168. 1971. English summary.

Identifiers: Alternatives, Aqueducts, *Caries prevention, *Fluoridation, *Italy, Rome.

The possible alternatives to water fluoridation reported in international scientific literature were reviewed. The effects of ingested and topically applied FI on caries prevention is discussed.—Copyright 1972, Biological Abstracts, Inc. W73-02160

Group 5G-Water Quality Control

CONTRIBUTION TO THE STUDY OF NITROGEN LEACHING IN A SANDY SOIL (*-DIOR') IN SENEGAL, Centre National de Recherches Agronomiques de Bambey (Senegal).

Bambey (Senegal).

D. Biondel. Agron Trop Ser Agron Gen Etud Sci. Vol 26, No 6/7, p 687-696. 1971. English summary. Identifiers: "Dior soils, "Pertilizers, Fixation, "Leaching, "Nitrogen, Nutrition, Plants, "Sandy soil, "Senegal, Soils.

The effect of N fertilizers, applied as nitrate and NH4-N at different periods on N leaching is described. Although the physical characteristics of 'dior' soils, together with the intensity and depth of rainfall tend to favor N losses due to leaching, the results indicate that they are finally limited the results indicate that they are Imally limited, whether N is applied as ammonium (very low loss) or nitrate. The build up of N can be promoted both by a physico-chemical process of fixation by the base exchange complex in the case of NH4-N and by a biochemical process of plant and microbial fixation in the case of nitrate-N or NH4-N. The importance of the root activity in the soil which limits the nitrate concentration of the soil solution by using mineral ions and activating the microbial life is indicated.—Copyright 1972, Biological Abstracts, Inc

WHAT'S IT ALL ABOUT. ALGAE, Buck, Seifeit and Jost, Morrisville, Pa.

J. M. Foulds. Water and Wastes Engineering, Vol 9, No 8, p 45-46, August 1972, 3 tab.

Descriptors: *Algae, *Nitrification, Waste treat-ment, *Phosphorus, *Nitrogen, Cost analysis, Ozone, Denitrification, Pollution abatement, Water pollution control, Coagulation. Identifiers: *Organic nutrients, Alum coagulation.

By commercial growth of algae from nitrification-denitrification plants or from raw sewage, fertil-izer might be produced with organic nitrogen and izer might be produced with organic nurrogen and phosphate in slow release, hard to leach forms. High rate algae forms show 70% nitrogen removal and 50% phosphorus removal, increasing to near 100% phosphorus removal with alum coagulation harvesting. The estimated cost is \$20,000 per acre, including land. Laboratory batch and continuous reactor studies in an ozonated system were made to prepare suitable effluents for a source of organic nutrients. Ozone oxidizes metals to higher states and sterilizes the effluent. The optimum ozone-oxygen rates were determined and the froth c nutrients. Ozone oxidizes metals to higher composition and volume at different gas rates were determined. It appears that the process is feasible with single or combinations of transition metals-necessary trace metals for lawn fertilizer. (Anderson-Texas) W73-02187

PETROLEUM TANKER POLLUTION MONI-TORING UNIT, Bailey Meters and Controls Ltd., London (En-

gland). nary bibliographic entry see Field 05A.

W73-02194

SEDIMENT CONTROL, Soil Conservation Service, Washington, D.C. D. K. Bowen. Agricultural Engineering, Vol 53, No 7, p 17-19, July 1972.

Descriptors: *Sedimentation, *Sediment control, *Sediment discharge, *Maryland, *Regulation, Water pollution control, Water pollution sources. Identifiers: Maryland Department of Natural Resources.

The state of Maryland's decision processes and resultant laws concerning sediment control stemmed from the recognition that uncontrolled erosion is a hydraulic pollutant. Due to suburbanization, the Potomac River and Sligo Creek were altered by the sediment discharges from land clearing operations. Regulations to control sedi-ment were developed and administered at the local level, with state 'oversight' providing uniformity sever, with state oversight providing uniformity between counties and comparable regulation for state agencies. County soil conservation districts handle the bulk of administration and enforce-ment, while the Maryland Department of Natural Resources handles the coordinating, regulating, and approval functions on a statewide level. The process and scope of Maryland's solution to sediment control is of value to any agency, county, or state devising such controls. (Anderson-Texas) W73-02200

SAVING THE DRAGOUT KEEPS PLATER WITHIN DISCHARGE LIMITS,
For primary bibliographic entry see Field 05D.
W73-02227

THE MINISTRY'S MEMORANDUM ON 'STAN-DARDS OF EFFLUENTS TO RIVERS WITH PARTICULAR REFERENCE TO INDUSTRIAL EFFLUENTS': A REVIEW, Severn River Authority (England).

Water Pollution Control, Vol 69, Part 3, p 334-348,

Descriptors: *Water pollution control, *Sewage effluents, *Industrial wastes, *Reviews, Standards, *Water quality standards. Identifiers: *Effluent standards.

The memorandum implies that 'norms' are irrelevant, specific cases ruling the limits imposed. However, equity and administrative problems are lessened with established norms. In addition, specific standards for existing effluents must be altered when newcomers arrive. Criticism of the antered when newcomers arrive. Criticism of the no norm policy also relates to the technical stimu-lus of establishing norms. There is a lack of clarity in the policy of 'relaxed standards', particularly in comparing water supply rivers and industrial rivers. Inequalities in standards for sewage and trade wastes are certain to lead to a lack of respect for river authorities, that inequality seemingly being in favor of industries. The memorandum has ooing in layor of industries. The memorandum has no effect on existing law, but seems to be an ad-mission of the undesirability of the present acts. If this is so, Parliament may be asked to determine the form of their amendment. An extensive discus-sion of the review is included. (Anderson-Texas) W73-02228

PROPOSED PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES.

Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06E.

REPORT TO THE WATER RESOURCES COUN-CIL BY THE SPECIAL TASK FORCE, FINDINGS AND RECOMMENDATIONS. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06E. W73-02232

SIERRA CLUB V. FROEHLKE (JUDICIAL REVIEW OF ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 06E.

THE PROBLEMS AND ISSUES OF IMPLE-MENTING NATIONAL WATER LEGISLATION AT SUBNATIONAL LEVELS, Oregon State Univ., Corvallis. Dept. of Geog-

raphy.
For primary bibliographic entry see Field 06E.
W73-02242

CONRAD V. BOARD OF SUPERVISORS OF LEE COUNTY (EXTENT OF LIABILITY FOR POLLUTION OF PRIVATE POND).

For primary bibliographic entry see Field 06E. W73-02244

IN RE JOHNSON ORCHARDS AND FARMS, INC. (JURISDICTION OF DEPARTMENT OF ENVIRONMENTAL CONSERVATION OVER ACCIDENTAL DISCHARGE OF CHEMICALS IN STATE WATERWAY).
For primary bibliographic entry see Field 06E.
W73-02246

UNITED STATES V. PENNSYLVANIA INDUSTRIAL CHEMICAL CORP. (DEFENSES TO CRIMINAL PROSECUTIONS UNDER THE REFUSE ACT).
For primary bibliographic entry see Field 06E.
W73-02247

DRIVE TO SAVE AMERICA'S SHORELINES For primary bibliographic entry see Field 06E. W73-02248

DEFENDING THE ENVIRONMENT-A CASE HISTORY, For primary bibliographic entry see Field 06E. W73-02250

ENVIRONMENTAL MANAGEMENT PUGET SOUND: CERTAIN PROBLEMS OF POLITICAL ORGANIZATION AND ALTERNA-TIVE APPROACHES, Washington Univ., Seattle. Div. of Marine For primary bibliographic entry see Field 06E.

PAVE THE WETLANDS OR LET THEM BE. Kingswood School, West Hartford, Con For primary bibliographic entry see Field 06E. W73-02252

PROMPT PASSAGE OF OCEAN DUMPING PROMPI PASSAGE OF OCEAN DUMP BILL IS URGED, Senate, Washington, D.C. For primary bibliographic entry see Field 06E. W73-0225

CONFERENCE REPORT ON S.2770, AMEND-ING FEDERAL WATER POLLUTION CON-For primary bibliographic entry see Field 06E. W73-02256 TROL ACT.

PUBLIC WORKS ON RIVERS AND HARBORS (BILL S.4018). For primary bibliographic entry see Field 06E. W73-02257

RODMAN DRAWDOWN SAVES TREES, House, Washington, D.C. For primary bibliographic entry see Field 06E. W73-02258

UP AND DO SUE-ATTENT For primar W73-02259

CLEAN RHE For primary b W73-02260

PROCEDURE AND RELATI Water Resour For primary b W73-02271

POLLUTION Chemical We

1972. 1 fig. Descriptors: ment, *North

ment, Treatm In anticipation Diamond Sha of the total ca

cals plant at pollution con plant wastes, facilities. All caught by a nected to the wastes are solids settle water quality because it p 100,000 tons To treat the has develop undesirable soluble hexa which is obt and West Vi W73-02282

POLLUTIO

Chemical ar

Descriptors *Operating tional prod Costs.
Identifiers:

The third as

on Environ dices of en show a gen major urba mates that 1980 to cle keep it clea lion for ca operating of 10-year per average and cent to 4.7 Association done will i for pollutio outlay will

UP AND DOWN WITH ECOLOGY-THE 'IS-SUE-ATTENTION CYCLE', For primary bibliographic entry see Field 06G. W73-02259

CLEAN RHETORIC AND DIRTY WATER, For primary bibliographic entry see Field 06E. W73-02260

PROCEDURES FOR EVALUATION OF WATER AND RELATED LAND RESOURCE PROJECTS. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06G. W73-02271

POLLUTION CONTROL SHINES IN CHROME CHEMICALS PLANT.

Chemical Week, Vol 110, No 25, p 77-78, June 21, 1972. 1 fig.

Descriptors: "Water pollution, "Pollution abatement, "North Carolina, "Water reuse, Waste treatment, Treatment facilities, Capital costs. Identifiers: "Chrome.

In anticipation of strict pollution standards, the Diamond Shamrock company allotted 20 percent of the total capital cost of their new chrome chemicals plant at Castle Haynes, North Carolina, to pollution control. The system has no outlet for plant wastes, except through the central treatment facilities. All process water is recycled I sake are plant wastes, except innough the central treatment facilities. All process water is recycled. Leaks are caught by a system of dikes and channels con-nected to the waste treatment sewer. Treated wastes are held in two six-acre iagoons where solids settle out. The only effluent is of drinking-ties are the six-acre in the settle of the settle contract. souds settle out. The only ettnient is of drinking-water quality, except for a higher chloride content. The plant generates large quantities of waste because it processes ore from South Africa that contains only about 45 percent chrome. A total of 100,000 tons per year of ore is shipped to the plant. To treat the plant's residue, Diamond Shamrock has developed a new process that combines two undesirable, waster to get an innecuous meterial undesirable wastes to get an innocuous material that can be used as landfill. The process combines soluble hexavalent chrome and spent pickle liquor, which is obtained from steel mills in the Baltimore and West Virginia areas. (Settle-Wisconsin) w73-02282

POLLUTION CLEANUP COSTS NAILED

Chemical and Engineering News, Vol 50, No 33, p 4, August 14, 1972. 1 fig., 1 tab.

Descriptors: *Pollution abatement, *Capital costs, *Operating costs, *Chemical industry, Gross national product, Water pollution, Air pollution, Identifiers: Economic growth.

The third annual report of the President's Council on Environmental Quality contains some new indices of environmental conditions. These indices acces or environmental condutions. I nese indices show a general decrease in air pollution in some major urban areas, but they show no significant improvement in water quality. The report also estimates that \$287 billion will be spent from 1971 to 1980 to clean up the nation's environment and keep it clean. This total breaks down into \$93 billion for control invertent and \$194 billion for lion for capital investment and \$194 billion for operating costs. These outlays will represent 2.2 percent of the total gross national product for the 10-year period, and are expected to reduce the average annual rate of GNP growth from 4.8 percent to 4.7 percent. The Manufacturing Chemists Association claims that its 137 member companies Association ciainst that its 17 memore companies alone will invest \$1.34 billion in capital equipment for pollution control between 1972 and 1975. This outlay will probably represent about 1.3 percent of these chemical companies' domestic sales; however, it will probably be 10 to 12 percent of their total domestic capital spending. The Association estimates that its members will expend \$235 mil-lion in 1972 on operating costs for pollution con-trol. (Settle-Wisconsin) W73-02283

PRINCIPLES AND PROBLEMS OF MUNICIPAL FINANCING, For primary bibliographic entry see Field 06C. W73-02289

SEWER SURCHARGES AND THEIR EFFECT

ON WATER USE, North Carolina State Univ., Raleigh, Dept of

Journal of the American Water Works Associa-tion, Vol 64, No 8, p 476-480, August, 1972. 6 fig, 8 tab, 7 ref.

Descriptors: "Sewerage, "Pollution taxes (Charges), "Water demand, Effluents, Industrial wastes, Prices, Biochemical oxygen demand. Identifiers: "Sewer surcharge, Waste load.

Theoretical considerations suggest that a sewer surcharge may either increase or decrease the quantity of water used by an industrial firm. The firm will pay less surcharge the more water it uses. Consequently, the net cost of additional water is reduced and the amount of water purchased from surcharge. Another effect of surcharges, however, is to reduce the dependence on water as a means to carry away wastes and hence to reduce the whole demand curve for water. Thus, the net result may be either an increase or decrease in water usage. The experience of several cities with sewer surcharges is also briefly examined. In 1967, Dur-ham, North Carolina, warned industry that a surcharge might be levied in 1970. The waste load decreased from 42 pounds per \$1,000 of value added in 1966 to 18 pounds in 1969. With the introduction of the surcharge in 1970, the waste load declined to 13 pounds. Greensboro, North Carolina, imposed surcharges which did not ap-Carouna, imposed surcharges which did not appear to reduce industrial wastes. However, they did seem to slow down the rate of increase. Other cities experienced decreased water usage after surcharges were levied. (Settle-Wisconsin) W73-02295

POWER, POLLUTION, AND PUBLIC POLICY, ISSUES IN ELECTRIC POWER PRODUCTION, SHORELINE RECREATION, AND AIR AND WATER POLLUTION FACING NEW ENGLAND AND THE NATION.

Massachusetts Inst. of Tech., Cambridge. Sea

Grant Project Office. For primary bibliographic entry see Field 06G. W73-02299

THE FRAMEWORK FOR ANALYSIS,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office. For primary bibliographic entry see Field 06G. W73-02300

WATER QUALITY IMPROVEMENT IN BOSTON HARBOR, Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.

For primary bibliographic entry see Field 06G. W73-02303

REGIONAL GOVERNMENT IN NEW EN-GLAND: A PROTOTYPE, Boston Univ., Mass. School of Law. For primary bibliographic entry see Field 06G. W73-02304

PROTECTION OF WATER SOURCES IN THE LOWER DNIEPER RIVER BASIN (OKHRANA VODNYKH ISTOCHNIKOV V BASSEYNE VODNYKH ISTOCHNIKOV V BASSEN NIZHNEGO DNEPRA), For primary bibliographic entry see Field 04A. W73-02329

SEPARATION OF LIGNIN FROM AQUEOUS SOLUTION BY ADSORPTIVE BUBBLE SEPARATION PROCESSES, Rutgers - The State Univ., New Brunswick, N.J. Dept. of Civil and Environmental Engineering. For primary bibliographic entry see Field 05D. W73-02350

NONLINEAR OPTIMAL CONTROL THEORY APPLIED TO A DISTRIBUTED FEED BIOCHEMICAL RIVER REACTOR WITH DUAL WATER QUALITY AND SELF PURIFICATION RESTRAINTS, Rutgers - The State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering. A. K. Mendiratta.

A. K. Mendiratta.

Ph.D. Thesis, June 1972, 180 p, 23 fig, 10 tab, 61 ref, 4 append. OWRR B-031-NJ (2).

Descriptors: *Systems analysis, *Water quality control, *Optimization, *Biochemical oxygen demand, Control, Effluents, *Waste assimilative capacity, Dissolved oxygen, Model studies, Self purification, *New Jersey, *Water quality standards.

Identifiers: Effluent distribution, *Optimal BOD, *Passaic River (NJ).

New water quality stream standards—dual and self-purification—are introduced and implemented. The dual water quality standard consists of a minimum allowable dissolved oxygen (DO) concentration at every point in the river segment, and a maximum allowable biochemical oxygen demand (BOD) concentration at a specified downstream point. The self-purification standard guarantees that the downstream water will never self-degrade till some pollutants are added to it. Enforcement of these new water quality stream standards on each these new water quality stream standards on each stream user will guarantee that the DO value is maintained above the minimum allowabl DO concentration at every point in the river, and that each stream user gets the water of comparable quality. Another constraint imposed on the system model is associated with no short-circuiting of the distributed effluent to the mixing point of the additional thread of the stream of t jacent downstream user. The project is restricted to a semirealistic case study, in which a single industrial chemical plant is discharging its wastes, dustrial chemical plant is discharging its wastes, which are bio-degradable, into a medium sized, non-tidal, fresh water stream segment of the type characterized by the Upper Passaic River in New Jersey between Pine Brook and Two Bridges. The biochemical transport model used for the treatment plant-river configuration study is a onedimensional, steady-state, deterministic, isother-mal, plug-flow type model, which is appropriately time-smoothed for use in turbulent flow situations.

REGIONAL MANAGEMENT OF WATER SUPPLY AND WASTEWATER DISPOSAL SUPPLY AND WASTEWATER DISPOSAL FACILITIES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 06B.
W73-02354

USER CHARGES AS A MEANS FOR POLLU-TION CONTROL: THE CASE OF SEWER SURCHARGES,

North Carolina State Univ., Raleigh.

D. Ethridge.

The Bell Journal of Economics and Management Science, Vol 3, No 1, (1972), p 346-354. OWRR B-032-NC (4).

Group 5G-Water Quality Control

Descriptors: "Water pollution control, "Industrial wastes, "Municipal wastes, "Elasticity of demand, "Economics, Effluents, Prices, Water demand, Food processing industry.

Identifiers: "Surcharges, "Effluent charges, "Economic incentives," Waste treatment demand.

Some cities in the U.S. are using sewer surcharges based on the strength of wastes discharged to in-duce industrial firms to decrease their discharges duce industrial firms to decrease their discharges of water-carried wastes. Many other cities are either in the process of instituting sewer surcharges or are considering instituting them. This study reports the estimates of the responses of the poultry and beet processing industries to sewer surcharges which were derived using two different estimation procedures. A surcharge of \$0.02 per pound of biochemical oxygen demand is estimated to decrease the total pounds by 75 percent for beet processing firms and approximately 25 percent for poultry processing firms. W73-02359

SEWER SURCHARGES AND THEIR EFFECT

ON WATER, North Carolina State Univ., Raleigh. Dept. of Economics.

J. A. Seagraves

Paper presented at 51st Annual Meeting, North Carolina Water Pollution Control Association, Durham, N.C., Nov 1971, 20 p. OWRR B-032-NC

Descriptors: *Water pollution control, *Industrial wastes, *Municipal wastes, *Elasticity of demand, *Economics, Effluents, Prices, Water demand,

Food processing industry.
Identifiers: *Surcharges, *Effluent charges, *Economic incentives, *Waste treatment demand. *Effluent charges,

The theory and use of surcharges for industrial wastes discharged to municipal sewer systems are described, including a review of surcharge systems used by North Carolina cities. Industrial response to water and surcharge rates is analyzed with emphasis on the poultry processing industry. (Howells-North Carolina) W73-02360

THE INDUSTRIAL DEMAND FOR WATER AND WASTE TREATMENT IN SELECTED U.S. CITIES WHICH ARE LEVYING SURCHARGES, North Carolina State Univ., Raleigh. Dept. of Economics.

R. D. Elliot Ph.D. Thesis, 1972, 98 p. OWRR B-032-NC (6).

Descriptors: *Water pollution control, *Industrial wastes, *Municipal wastes, *Elasticity of demand, Effluents, Prices, Water demand. Identifiers: *Surcharges, *Effluent charges, *Economic incentives, Waste treatment demand.

The effects of surcharges on industrial wastes discharged into municipal systems and on the quantity of water demanded from municipal systems by industrial firms were investigated. Multiple regression equations based upon an operational theory of how industries respond to sewage surcharges were specified for estimating elasticities of demand. 198 time-series observaclassicities of uchanic. 1984 time-series observa-tions were obtained from 34 cities in the U.S. using surcharges. Data contained practically no price and quantity variation within cities, but there was considerable variation across cities. Conclusions were: (1) a 44 percent reduction in the pounds of BOD per \$1000 value added discharged by industry would be expected if the average surcharge of \$20 per 1,000 pounds of BOD were levied against industrial firms. At this average surcharge, a 10 percent increase in the surcharge would result in about an 8 percent decrease in wastes. (2) A 35 percent reduction in industrial water consumption per \$1000 value added would accompany the introduction of the average surcharge of \$20 per

1,000 pounds. A 10 percent increase in the average surcharge would result in about a 6 percent decrease in water usage. (3) The social gain associated with introducing an average surcharge of \$20 per \$1000 value added was estimated to be \$.58 per \$1000 value added or \$5.08 million per year for the 33 cities furnishing BOD data. The aggregate social gain from the adoption of surcharges was estimated to be \$35.66 million for the major wasterslated industries. related industries. W73-02361

ALTERNATIVE DEMANDS FOR WATER AND LAND FOR AGRICULTURAL PURPOSES, LAND FUR AGRICULTURAL PURPOSES, lowa State Univ., Ames. Center for Agricultural and Rural Development. For primary bibliographic entry see Field 06D. W73-02363

COURTS AND WATER, THE ROLE OF THE JUDICIAL PROCESS, Environmental Law Inst., Washington, D.C. For primary bibliographic entry see Field 06E. W73-02365

WATER POLLUTION CONTROL IN THE UNITED STATES.
National Water Commission, Arlington, Va.

Available from the National Technical Informa-tion Service as PB-212 139, \$6.75 in paper copy, \$0.95 in microfiche. National Water Commission Report NWC-EES-72-059, November 1971, 270 p.

Descriptors: Water pollution, *Water pollution control, *Pollution abatement, *Water quality, In-stitutions, Storm runoff, Public health, Waste disposal, Farm wastes, Industrial wastes, Sewage

Perspective is provided on water pollution control problems in the United States, with an analysis of responsibilities and roles of local, state, and Federal governments and regional organizations, the objectives, and costs of present pollution abatement programs, and their effectiveness toward reaching national goals. A panel of consultants, assisted by the staff of the National Water Commission, produced the report in an effort to provide guidance to the Commission in the implementation of a national policy which could implementation of a national policy which could bring the waters of the country to acceptable stan-dards in ten years. Numerous recommendations are made with respect to setting realistic goals and standards, workable programs of Federal assistance, public participation, enforcement and regulation, research, and policy formulation. The panel believes that an all-out effort should be made to meet water quality standards adopted under the provisions of the Water Quality Act of 1965 by 1981. (NWC) W73-02366

ELECTRIC LOGGING APPLIED TO GROUND WATER EXPLORATION, Geological Survey, Baton Rouge, La. Ground For primary bibliographic entry see Field 08G. W73-02402

JET CLEA DESCRIBED. CLEANING OF WATER WELLS For primary bibliographic entry see Field 08B.

WATER UTILITY DISTRIBUTION LOSS,

D. Smeiser. Water and Sewage Works, Vol 108, No 8, p 318-321, August 1961; Vol 108, No 9, p 335-338, Sep-tember 1961; Vol 108, No 10, p 390-394, October 1961; Vol 108, No 11, p 439-443, November 1961. 10 fig, 9 tab, 18 ref.

Descriptors: "Water loss, "Leakage, "Water dis-tribution (Applied), Water utilization, Test procedures. Identifiers: Water accounting system, Seepage.

With water demands rising and water supplied in-creasingly difficult and costly to develop, a major concern is waste and loss in distribution systems. A loss control program begins with assuring an ac-curate meter reading at the point the finished water enters the system. Next, the unavoidable losses in a particular system, or those that would cost more to locate and repair than to allow, must be established. A certain amount of leakage results from new construction but can be reduced if American Water Works Association specifications are followed. Losses which occur in reservoirs and elevated tanks, main breaks and large leaks, are followed. Losses which occur in reservoirs and elevated tanks, main breaks and large leaks, hydrants, flushing mains, distribution operation usage, lost services, illegal use of water, unmetered water sales, metered uses by the utility, and customer meter slippage can be recorded, and in some cases eliminated. A Water Accounting Uniform System of Accounts, identifying all uses with account numbers, facilitates this record-tension and balbs direct exprections effort (Weiters). keeping and helps direct correction efforts. (Weir-AWWARF) W73-02431

PREVENTION OF POLLUTION FROM THE IN-DUSTRIAL USE OF OIL, Water Pollution Research Lab. Stevenage (En-

aland). For primary bibliographic entry see Field 05D. W73-02434

HYDRO-ECOLOGICAL PI MARINAS IN PUGET SOUND, PROBLEMS Washington Univ., Seattle. Dept of Civil Enincering. ary bibliographic entry see Field 05C. For primar W73-02462

ENVIRONMENTAL QUALITY. A CHALLENGE FOR ACHIEVEMENT, Datatronic Systems Corp., Panorama City, Calif. Computer Sciences and Environmental Technolo-

Computer Sciences and Environmental Technology Div.
M. P. Milane.
Available from NTIS, Springfield, Va., 22151 as
PB-209 744, Price \$3.00 paper copy; 95 cents
microfiche. Datatronic Systems Corporation Final
Report DC 72-10177, April 7, 1972. 29 p.

Descriptors: "Water pollution control, "Environ-mental control, "Ecology, "Pollution abatement, Reviews, Air pollution, Waste disposal, Public health, Sanitary engineering, Water chemistry, Trace elements, Urbanization, Water quality con-trol.

This presentation is an overview of what is going This presentation is an overview of what is going on in the technology associated with environmental pollution, of current facts on the environment, of what the chemist can do to alleviate problems in environmental pollution, and of a challenge to apply several alternatives to insure tomorrow's environmental quality. The address was made to the American Chemical Society at Harvey Mudd College, Claremont, California, April 7, 1972. The role of the chemist is emphasized in improving environmental quality demands and in understanding the environmental problems. (Woodard-USGS) W73-02485. W73-02485

TOWARD EFFECTIVE AND EQUITABLE POL-LUTION CONTROL REGULATION, American Management Association, New York. F. D. Buggie, and R. Gurman. Research Report 1972. 41 p, 3 fig, 16 tab, 14 ref.

Descriptors: *Industries, *Data collections, *Pollution abatement, *Environmental control, Evaluation, Surveys, Water pollution control,

Abatement, Inc. wastes, Air pollu-lutants, Standard

This survey sho problem which m porting regarding controlling the po-ing from their ered from a turing executives and the regulated by the principal to be the most ef control regulatio benefits as an is problems. A nee concrete direction and development Manufacturing of toward effective establishment o uniform applicat major problem a to evaluate, revidards and writing W73-02520

MAINTENANCE ALBERTA'S L R. W. Thompson Alberta Law Re

Descriptors: *C law, *Water po Water law, Water decisions, Admi control, Riparian Administrative development, C Chemical wast Reasonable use, tive rights, Wast Identifiers: *Alb

In 1971 the Clean berta, aimed at controlling and by misuse of the with water pollu ing: the Departm Resources Cons servation Act. Health Act, the the Water Reso created by legisl in a manner sat against a pollute in tort is theore the riparian lan reasonable use to pure water. of government legislative schen W73-02525

THE NEED TO Senate, Washin For primary bibl W73-02526

OIL POLLUTIO (H.R. 15627), House, Washing For primary bibl W73-02528

WATER QUALITY MANAGEMENT AND PROTECTION—Field 05

Water Quality Control—Group 5G

Abatement, Industrial production, Industrial wastes, Air pollution, Pollutant identification, Pollutants, Standards.

This survey shows that business has an image problem which mostly stems from slanted news reporting regarding what companies are doing about controlling the pollution of the environment resulting from their operations. The material was gathered from a questionnaire survey of manufacturing executives; personal and telephone interviews with representatives of both the regulators and the regulated; and the encounters experienced by the principal author. State remissions were fell and the regulatory, and the encounters expensioned by the principal author. State regulators were felt to be the most effective in administering pollution control regulation. Most businessmen prefer tax benefits as an incentive for correcting pollution ceneris as an incentive for correcting pollution problems. A need is felt for the Environmental Protection Agency to set firm standards, provide concrete direction, and perform more research and development in the area of pollution control. and development in the area of pointion control.

Manufacturing executives feel the 'first steps' toward effective pollution control should be: (1) establishment of national standards and their establishment of national standards and their uniform application; (2) establishment of defini-tions, meaningful standards, and identification of major problem areas; and (3) industrial specialists to evaluate, review and participate in setting stan-dards and writing legislation. (Wheeler-Florida) W73-02200

MAINTENANCE OF WATER QUALITY—ALBERTA'S LEGISLATIVE SCHEME AND THE COMMON LAW, R. W. Thompson, and M. Wild.
Alberta Law Review, Vol 10, p 354-373, 1972. 136

Descriptors: *Canada, *Legislation, *Common Descriptors: "Canada, "Legislation, "Common law, "Water pollution control, Legal aspects, Water law, Watercourses (Legal aspects), Judicial decisions, Administrative agencies, Water quality control, Riparian rights, Adjudication procedure, Administrative decisions, Water resources development, Oil pollution, Thermal pollution, Chemical wastes, Water pollution sources, Reasonable use, Natural flow doctrine, Prescriptive rights, Waste disposal, Riparian lands. Identifiers: "Alberta (Canada).

In 1971 the Clean Water Act came into force in Alin 1971 the Crean water Act came into tree in Al-berta, aimed at providing an effective means of controlling and eliminating the problems created by misuse of the environment. Legislation dealing with water pollution in Alberta is described includwin water pointion in Alberta's described including: the Department of the Environment Act, the Environment Conservation Act, the Clean Gas Conservation Act, the Oil and Gas Conservation Act, the Clean Water Act, the Public Health Act, the Agricultural Chemicals Act, and the Water Resources Act. Should the authorities created by legislation fail to carry out their duties in a manner satisfactory to the citizens, redress mainter satisfactory to the citizens, recties against a polluter by way of damages or injunction in tort is theoretically available. At common law the riparian landowner had the right to the undiminished flow of water, subject only to the reasonable use of upstream owners, and the right to pure water. Thus, the private riparian owner still has the power to fight in the courts any abuse of government discretion exercised under the legislative scheme. (Brackins-Florida) W73-02525

THE NEED TO CONTROL OCEAN DUMPING. Senate, Washington, D.C.
For primary bibliographic entry see Field 06E. For primary

OIL POLLUTION ACT AMENDMENTS OF 1972 Oll. Forest. (H.R. 15627), House, Washington, D.C. For primary bibliographic entry see Field 06E.

THE MEXICAN WATER TREATY AND ITS RELATIONSHIP TO COLORADO RIVER WATER SUPPLIES, House, Washington, D.C. H. T. Johnson. Congressional Record, Vol 118, p E8317-E8319 (daily ed.) October 3, 1972.

Descriptors: *Mexican Water Treaty, *Saline water, *Salt balance, *Treaties, *Colorado River, Irrigation effects, Irrigation practices, Water quality control, Mexico, Colorado River Basin, Salinity, Impaired water quality, Irrigation systems, Water pollution sources, Water supply, Water supply development, Water demand, Legal aspects, Water utilization.

The 1944 Mexican Water Treaty covers the waters of the Colorado, Rio Grande and Tijuana Rivers. The treaty specifies the quantity of water each na-tion will receive from these rivers, however, it makes no specific reference to water quality. Between 1945 and 1961 no problems arose with respect to water quality; but in 1961 the Welton-Mohawk Project operations returned drainage water into the Colorado River with high salinity. Furthermore, beginning in 1961 there was a reduction in the amount of dilution water released into the Colorado River. Consequently there was a sharp increase in the salinity of the water delivered to Mexico, which resulted in streauous objections from Mexico. Beginning in 1970 negotiations have been conducted between Mexico and the Unite States seeking an equivalent salt balance. Salt States seeking an equivalent sait obtained an irrigation system means the amount of salt returned in drainage waters is equal to the amount of salt in the water applied to the land. This controversy is still outstanding as negotiations continue. Mexico's position is that it should receive the same quality of water as that at Imperial Dam. Arriving at a permanent solution on this issue poses a formidable task for the Nixon administration in the coming months. (Brackins-Florida) W73-02529

CONFERENCE REPORT ON THE FEDERAL WATER POLLUTION CONTROL ACT AMEND-MENTS OF 1972, House, Washington, D.C.

R. E. Jones.

Congressional Record, Vol 118, p E8454 (daily ed.) October 10, 1972.

Descriptors: *Federal Water Pollution Control Act, *United States, *Legislation, *Administra-tion, Water law, Legal aspects, Watercourses (Legal aspects), Pollution abatement, Water pollution control, Waste disposal, Navigation, Permits, Boating, Administrative agencies.

Identifiers: *Federal Water Pollution Control Act

Amendments of 1972.

It is the position of the House conferees on the Federal Water Pollution Control Act Amendments of 1972 that any restriction or prohibition of any defined area as a disposal site must be made in consideration of navigation and waterborne commerce. In making a determination to deny a permit under subsection 404 (b) the Secretary of the Army is required to evaluate the economic impact of such denial on navigation and anchorage. The provision for removal of in-place toxic pollutants to section 115 is not limited to Great Lakes Harbors, but is intended to apply to all critical port and harbor areas. Recreational marine engines are not 'point sources' within the definition used by the Act and thus discharges from these engines do not require a permit. There may be other areas where similar problems with the new legislation are created; the concerned agencies should bring these problems to congressional attention in order that a olution may be promptly reached. (Brackins-W73-02530

DOW CHEMICAL CO. V. DIXIE CARRIERS, INC. (PRIVATE CANAL SUBJECT TO REGULATION UNDER RIVERS AND HARBORS ACT). For primary W73-02533 ry bibliographic entry see Field 06E.

MICROBIAL DEGRADATION OF PESTICIDES IN AQUEOUS SOLUTIONS, Sverdrup, Parcel and Associates, Inc., St. Louis,

Mo. For primary bibliographic entry see Field 05B. W73-02534

METHODOLOGY IN ESTABLISHING WATER

QUALITY STANDARDS, Washington Univ., Seattle. C. A. Rainbow, and R. O. Sylvester. Journal Water Pollution Control Federation, Vol 39, No 7, p 1155-1163, July 1967. 1 tab, 3 ref.

Descriptors: *Water quality standards, *Waste water treatment, Instrumentation, *Control, Water quality control, *Washington, *Water treat-

as a part of a water quality study in the state of Washington, a set of water quality parameters and values thereof was proposed and is given. Basic premises followed include: the objective is to achieve or maintain clean water, there does not exist a right to pollute water, assimilation and dispersion of pollutants is not a beneficial use of water but is a necessary use, assimilation of residues from treated wastewaters must be apportioned on an equitable basis, and all wastewater discharges should receive at least minimum treatment. It is necessary to have water quality objectives toward which control efforts may be directed; these may be represented as standards and goals of water quality. Three conditions exist in applying these values to specific waters: present quality exceeds goal values, present quality is below goal values but exceeds standard values, or present quality is below standard values, or AWWARF)

VIRUCIDAL EFFECTS OF CHLORINE IN

WASTEWATER,
Maine Univ., Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D. For primary W73-02538

ECONOMIC ANALYSIS OF ALTERNATIVE WATER POLLUTION CONTROL MEASURES, Iowa Univ., Iowa City. Dept. of Economics. H. A. Lofgreen, Jr. Ph.D. Thesis, 1972. 195 p, 2 fig, 66 tab, 69 ref, 3 append. OWRR A-018-IA (4).

Descriptors: Water quality, *Cost benefit analysis, Legal aspects, *Economics, Water quality control, *Iowa, *Water pollution control, Costs.

The potential cost of water quality commitments as well as ways in which that cost might be minimized within the guidelines of improved water quality are explored. The legal and economic quanty are exported. The legal and economic structure within which pollution control must be undertaken is examined. Theoretical conditions for determining desired levels of water quality are considered along with the problems of applying benefit-cost analysis. Decisions as to the desired level of water quality must be made on limited information. Examples of such specifications are formation. Examples of such specifications are given for flowa. However, such decisions should be made in light of the economic costs, even if benefits are not clearly specified. The cost of some treatment methods and the total costs possible under general requirements which necessitate such treatment methods are analyzed. Cost of control estimates are presented for a number of treat-

Group 5G-Water Quality Control

ment sequences which are used as a proxy for varying levels of water quality. Estimates of alter-native costs of capital are made for the Nation and mative costs of capital are made for the Nation and Iowa, and separate figures are given for municipal and industrial dischargers. The information is utilized to estimate annual costs of water pollution control generated by spending to eliminate 1968 level capital deficiencies. Consideration is also given to the characteristics of pollution control costs to the extent of examining the existence of scale economies. Per unit costs, varied to reflect changing scale assumptions, are used to discuss the case for regional river basin management authorities as a cost minimizing technique for water quality control.

LAWS FOR A BETTER ENVIRONMENT.
Oregon State Unov., Corvallis. Water Resources For primary bibliographic entry see Field 06E. W73-02560

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

OPTIMIZATION OF WATER RESOURCES DEVELOPMENT: OPTIMIZATION OF CAPACITY SPECIFICATIONS FOR COM-PONENTS OF REGIONAL, COMPLEX IN-TEGRATED, MULTIPURPOSE WATER

PONENTS OF REGIONAL, COMPLEX INTEGRATED, MULTIPURPOSE WATER RESOURCES SYSTEMS, California Univ., Los Angeles. School of Engineering and Applied Science. W. W-G. Yeh, and M. J. Trott. Available from the National Technical Information Service as PB-213 179, \$3.00 in paper copy, 30.95 in microfiche. Completion Report UCLA-ENG-7245, June 1972, 34 p., 5fig. 6 tab, 16 ref, append. OWWR C-1668 (No 3154) (2).

Descriptors: Water resources development, *Planning, Reservoir storage, *Reservoir operation, Cost-benefit analysis, *Dynamic programming, *Optimization, System analysis, Operation research, Multiple-purpose projects, *Multiple-purpose reservoirs, *California, Design criteria

Identifiers: Incremental dynamic programming, Successive approximation, Decomposition, *Eel River (Calif)

A method was developed to determine the best possible set of design parameters for regional, complex, multi-purpose water resources system. complex, multi-purpose water resources system. The parameters were the design capacities of a complex reservoir system. The optimization was subject to the requirements of the many constraints that must be imposed, including hydrological, economic, social, political and legal constraints, as well as the usual physical limitations. The original problem of high dimensionality was decomposed by successive approximations into a series of subproblems of low dimensionality in such a way that the sequence of optimizations over the subproblems converged back to the original one. The optimal design was obtained by maximizing the net benefits subject to the required constraints. Incremental dynamic programming constraints. Incremental dynamic programming was used to find the optimal operating policy. The theories developed were applied to a real system, i.e., the Eel River Ultimate Project in Northern California. W73-01970

OPTIMUM CONJUNCTIVE USE OF A DUAL-PURPOSE DESALTING PLANT AND MULTI-FURPOSE SURFACE WATER RESERVOIRS, Econotech Systems, Inc., Los Angeles, Calif. For primary bibliographic entry see Field 03A. OPTIMIZING THE OPERATION OF ISRAEL'S

Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering. For primary bibliographic entry see Field 06B. W73-0228

NONLINEAR OPTIMAL CONTROL THEORY APPLIED TO A DISTRIBUTED FEED BIOCHEMICAL RIVER REACTOR WITH DUAL WATER QUALITY AND SELF PURIFICATION RESTRAINTS, Rutgers - The State Univ., New Brunswick, N.J. Dept. of Chemical and Biochemical Engineering. For primary bibliographic entry see Field 05G. W73-02352.

A MIXED INTEGER PROGRAMMING AP-PROACH TO PLANNING MULTIPLE WATER SOURCES FOR MUNICIPAL WATER SUPPLY, Utah State Univ., Logan. Coll. of Engineering.

T. C. Hughes.
Utah Water Research Laboratory Report PRWG73-3, March 1972. 182 p, 14 fig, 36 tab, 2 append, 72 ref.

Descriptors: "Water supply, "Planning, Municipal water, "Water demand, Water sources, "Utah, "Risks, Stochastic processes, "Optimization, Mathematical models, Systems analysis, Reservoirs, Storage, Groundwater availability, Costs, Surface water, Constraints, Dynamic programming, Linear programming, Dynamic programming, "Muser in the programming, Bountiful City (Utah), Chance constrained programming.

ful City (Utah), Chance constrained programming. In order to insure a dependable future water supply, the municipal planning engineer must estimate probable demands over the appropriate time horizons and determine the economically optimum combination of capital investment program and set of operating rules to meed these demands. The planning problem calls for a self optimizing mathematical programming model capable of handling uncertainty in both supply and demand. The approach chosen is mixed integer programming. Its advantage over linear programming is its ability to handle stochastic variables. Moreover, it provides a means for automatically adding or removing the uncertainty penalty for a given variable as that variable is added or removed from the basis during the iterative search for the optimum solution. The algorithm selects the least cost combination of source-facilities which will provide the specified quality of service. The format used in the study is to develop a general form of the model which will handle numerous types of sources-facility combinations (with or without long term storage). The model is then applied to an actual planning situation for Bountful City, Utah, a residential development area. Since the Bountful City problem does not have a storage reservoir alternative, an additional, hypothetical system is used to demonstrate this capability. (Bell-Cornell)

MODELING AND SENSITIVITY ANALYSIS FOR PLANNING DECISIONS IN WATER RESOURCES EXPANSION, Texas Univ., Austin. Dept. of Chemical Engineer-

For primary bibliographic entry see Field 04A. W73-02541

WATER ECONOMICS, California State Dept. of Water Resources, Sacramento. For primary bibliographic entry see Field 04B. W73-02543

PRELIMINARY ANALYSIS OF SURFACE WATER AVAILABILITY, Saskatchewan-Nelson Basin Board, Regina. For primary bibliographic entry see Field 04A.

W73-02544

IRRIGATION MANAGEMENT-A TOOL FOR AGRIBUSINESS, Bureau of Reclamation, Denver, Colo. Water Operations Branch.
For primary bibliographic entry see Field 03F.
W73-02546

HYDROLOGIC MODELING, Illinois Univ., Urbana. Dept. of Engineering. For primary bibliographic entry see Field 02A. W73-0254

6B. Evaluation Process

ECONOMIC ANALYSES OF OPTIMAL WATER QUALITY MANAGEMENT, Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 05G. W73-01951

ASSESSMENT OF TURBIDITY, COLOR, AND ODOR IN WATER, Anacapa Sciences, Inc., Santa Barbara, Calif. For primary bibliographic entry see Field 05G. W73-01971

WATER QUALITY MANAGEMENT, AN ANAL-YSIS OF INSTITUTIONAL PATTERNS, Iowa Univ., Iowa City. Dept. of Urban and Re-gional Planning. gional Planning.
For primary bibliographic entry see Field 05G.
W73-01978

ADMINISTERING STATE RESOURCES: THE NEED FOR LONG RANGE PLANNING, For primary W73-01979 bibliographic entry see Field 06E.

REVISION OF COMPLETED REGIONAL OR RIVER BASIN PLANS, A POLICY STATE-Water Resources Council, Washington, D. C.

Available from the National Technical Information Service as PB-209 147, \$3.00 in paper copy, \$0.95 in microfiche. September 8, 1971. 4 p.

Descriptors: *Project planning, *Water resources development, *River basins, *Regional development, Planning, Project purposes, Water resources, Water management (Applied), Research and development, Documentation, Projects, Water policy, Watersheds (Basins), Watershed management, Adoption of practices.

Water Resources Council has recognized that after regional or river basin plans have been completed and transmitted for approval, modification or revision may be warranted to reflect changes in goals and technological advances. In general, policy revisions must be prepared in the same degree of detail as the original plan. Requests for revisions may come either from the public or private sectors. A major revision would be one affecting basic interrelationships in plan performance or management. Minor revisions would not significantly affect these relationships. Reports proposing revisions, standing inter-agency committees or to the Water Resources Council. Reports proposing major revisions must be prepared in accordance with certain guidelines. The report must include a summary of the changed factors leading to proposing revisions, data and other information supporting the need and justification for the change, environmental statements

and coo Council recomme W73-019

FURTH TION O MENTA Utah Wa For prim W73-020

OPTIMU -PURPO For prim W73-020

DEVELO American Committe Water Su Journal o

April 196 Descripto Water ut

The Com research water res face; goo tion, indi in varying pricing; enance. themes knowled acceptan sources: water fro tion of in

historic f of accur teristics. W73-0212

MANAGI ING PRO Philadelp S. S. Bax tion, Vol Descripto

Planning, Identifier

Knowled ment's se not, how the peopl all faciliti to serve manager within th the mans

ON THE For prima W73-0213

W73-0212

and coordination with concerned agencies. The Council will review such reports and formulate recommendations. (Nielsen-Florida) w71.01992

FURTHER STUDIES OF OPTIMUM OPERA-TION OF DESALTING PLANTS AS A SUPPLE-MENTAL SOURCE OF FIRM YIELD, Utah Water Research Lab., Logan. For primary bibliographic entry see Field 03A. W73-02082

OPTIMUM CONJUNCTIVE USE OF A DUAL-PURPOSE DESALTING PLANT AND MULTI-PURPOSE SURFACE WATER RESERVOIRS, Econotech Systems, Inc., Los Angeles, Calif. For primary bibliographic entry see Field 03A. W73-02083

RESEARCH NEEDED ON AVAILABILITY AND DEVELOPMENT OF WATER SUPPLY. American Water Works Association, New York. Committee on Availability and Development of Water Supply.

Journal of the American Water Works Association April 1969. Vol 61, No 4, p 159-162, 9 ref.

Descriptors: *Water supply, Water resources, Water utilization, Water management (Applied), Resource development, *Research priorities.

The Committee on Availability and Development of Water Supply has identified water supply research needs. Part one of their report sumarizes existing knowledge: accurate data on water resources including ground water and surface; good statistics on water demands for irrigation, industry, and public supply; per capita usage in varying areas of climatic differences; water pricing; degree of urbanization; and system maintenance. Part two suggests specific research themes which would fill gaps in existing knowledge of water supply, among them: public acceptance of alternative municipal water supply sources; optimal recovery of high quality recharge water from brackish or saline aquifers; modification of infiltration rates; urban water requirements in relation to regional planning; and length of historic flow records required for differing levels of accuracy in definition of stochastic characteristics. (Weir-AWWARF)

MANAGER'S ROLE IN THE DECISION MAK-ING PROCESS, Philadelphia Water Dept., Pa.

Journal of the American Water Works Association, Vol 60, No 12, p 1323-1327, December 1968.

Descriptors: *Management, *Decision making, Planning, Social aspects. Identifiers: *Publicity.

Knowledge of the water system in the Department's service area is vital to the manager. This is not, however, the only requirement. The needs of the people are also a primary consideration since all facilities and equipment in the system are there to serve these people. It is the concern of the manager to know and communicate the needs within the Department's service area. With this, the manager must propose workable solutions which remain within the framework of the political structure in the area. (Kruse-AWWARF)

ON THE RECREATIONAL USE OF DOMESTIC WATER SUPPLY RESERVOIRS. American Water Works Association, New York. For primary bibliographic entry see Field 05G. W73-02132

THE CENSUS AND WATER UTILITIES, Bureau of the Census, Washington, D.C. Population Div. For primary bibliographic entry see Field 06D. W73-02136

NATIONAL SHORELINE STUDY, REGIONAL INVENTORY REPORT, NORTH ATLANTIC REGION. Corps of Engineers, New York. North Atlantic Div. For primary bibliographic entry see Field 08B. W73-02186

PROPOSED PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 66E.

REPORT TO THE WATER RESOURCES COUN-CIL BY THE SPECIAL TASK FORCE, FINDINGS AND RECOMMENDATIONS. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06E. W73-02232

THE PROBLEMS AND ISSUES OF IMPLE-MENTING NATIONAL WATER LEGISLATION AT SUBNATIONAL LEVELS, Oregon State Univ., Corvallis. Dept. of Geography. For primary bibliographic entry see Field 06E. W73-02242

UP AND DOWN WITH ECOLOGY—THE 'IS-SUE-ATTENTION CYCLE', For primary bibliographic entry see Field 06G. W73-02259

WHAT PRICE WATER,

L. Shloss. Government Executive, Vol 4, No 7, p 65-66, July,

Descriptors: *Water resources development, *Cost-benefit analysis, *Multiple-purpose projects, Tangible benefits, Intangible costs, Intangible benefits, Intangible costs, Planning, Management. Identifiers: *Water Resources Council.

The Water Resources Council has proposed a new set of Principles and Standards which would deemphasize economic benefits in favor of ecological factors. The most controversial of the proposed rules involves raising the discount rate from the current five and three-eighths percent to seven percent. Federal agencies are required to charge themselves this interest on the cost of a project when calculating the cost-benefit ratio for the project. Undoubtedly, a higher discount rate would turn favorable cost-benefit ratios into unfavorable ones. Under the new proposals, potential water and land resource programs would be subjected to comprehensive multi-objective planning and analysis. The proposals would also require the development of alternative plans for each planning situation so that impact on national economic development, environmental quality, and regional development can be fully measured. These alternative plans would be subjected to careful review at all levels of government. All potential beneficial and adverse effects, both monetary and non-monetary, would be considered before the final selection was made. Inputs from private groups and individuals would be solicited throughout the planning process. (Settle-Wisconsin)

WATER SYSTEM, Technion - Iarael Inst. of Tech., Haifa. Dept. of Civil Engineering. U. Shamir. Technology Review, Vol 74, No 7, p 41-48, June, 1972. 7 fig.

OPTIMIZING THE OPERATION OF ISRAEL'S

Descriptors: "Water supply, "Mathematical models, Water management (Applied), Water sources, Water supply development, Optimization, Water control, Management, Planning. Identifiers: "Water supply system, "Israel.

To manage a water supply system and provide short-term operating rules and long-range development plans requires not one computer model but a family of them, each with a different viewpoint but aware of the others, all incorporated into a common structure. The mathematical models used in managing Israel's centrally controlled water system include a decades-model of the entire actional water system; a yearly-model of the main water system; and a number of instantaneous-models, one for the water system's main grid and one for each of Israel's local projects. The yearly-model and the main grid model are in advanced stages of development, and results are being implemented as they are obtained. One model for a large local water project has also been completed. However, work on the decades-model is still in its initial phases. Each of these models is examined in terms of their focus, time-scale, decision output, inner constraints, objectives, frequency of use, data requirements, oppimization algorithm, and parameters. (Settle-Wisconsin) W73-02287

GREAT LAKES BASIN COMMISSION CHAL-LENGES FOR THE FUTURE. AN INTERIM RE-PORT ON THE GREAT LAKES BASIN FRAMEWORK STUDY. Water Resources Council, Washington, D.C.

Available from the National Technical Information Service as PB-209 166, \$3.00 in paper copy, \$0.95 in microfiche. August, 1971. 27 p, 6 fig.

Descriptors: *Great Lakes Region, *St. Lawrence Seaway, *Projections, Employment, Population, Income, Water utilization, Management, Water resources development, Land use, Economics. Identifiers: Social institutions.

The basic purpose of the Great Lakes Basin Framework Study is to develop (1) projections of water and related land resource availability, and (2) estimates of the probable costs of meeting resource needs. As a reconnaissance-type investigation, the Framework Study is designed to provide broad-scale analyses of resource needs and problems, and generalized estimates of the probable nature, extent, timing, and cost of measures to solve these problems. Twenty-seven work groups were established to undertake this study. The focus of these work groups is divided between basic resource information with five groups, water use and management with seven groups, land use and management with six, economic and social institutions with two, environmental quality with three, and program formulation and reports with four. Preliminary investigations have indicated that population, employment, and per capita income in the Great Lakes-St. Lawrence Seaway is projected to increase to 284 million tons in 1980, 374 million tons in 2000. Other topics briefly discussed include water quality, power, recreation, aeathetic and cultural resources, shore use and erosion, and land use. (Settle-Wisconsin)

Field 06-WATER RESOURCES PLANNING

Group 6B—Evaluation Process

THE DEVELOPMENT OF ISRAEL'S WATER

RESOURCES, Tahal Consulting Engineers Ltd., Tel Aviv (Israel).

(ISTREE).

A. Wiener.

American Scientist, Vol 60, No 4, p 466-473, July-August, 1972. 8 fig.

Descriptors: "Water resources development, "Water supply development, "Water supply, Water demand, "Planning, Wells, Rivers, Irrigation, Water utilization. Lidentifiers: "Israel.

The development of Israel's water resources oc-curred in four stages. Shortly after the establish-ment of the state of Israel, a general overall master plan was formulated, and short-term local and rement of the state of Israel, a general overall master plan was formulated, and short-term local and regional water development projects were initiated. These projects, while satisfying anticipated short-term needs, were designed to fit into the overall framework of the national master plan. These first-generation projects usually drew their water from shallow wells drilled into the coastal sand-stone formations. Second-generation projects derived their water from springs and deeper wells drilled into the limestone formations of the Judae-an mountains. These projects were integrated into the national water grid by interconnection with the Jordan River System. By the end of the 1950's, work was started on the main integrating feature of Israel's water system, the Jordan River System, representing the third generation of projects. The fourth generation of projects focused on such unconventional approaches to water resources development as interception of flood flows and sewage reclamation. Over the past two decades, all of these projects have made it possible for water utilization to increase from 17 to 95 percent. Future water needs may require relatively large-scale desalting of sea water. (Settle-Wisconsin) W73-02292 W73-02292

EVALUATING RECREATIONAL POTENTIAL OF SMALL STREAMS, Kentucky Univ., Lexington. Dept. of Civil En-

gmeering.

J. A. Dearinger.

Journal of the Urban Planning and Development
Division, American Society of Civil Engineers,
Vol 98, No UP1, p 85-102, July, 1972. 1 fig, 4 tab, 24 ref, 1 append

Descriptors: *Streams, *Value, *Recreation, Evaluation, Methodology, Camping, Fishing, Kentucky. Hiking, Picnicking, *Lexington

A method for evaluating the recreational potential of small naturalistic streams and their watersheds of small naturalistic streams and their watersheds was developed and tested through case studies of two streams near Lexington, Kentucky. The methodology is divided into two phases, (1) inventory, and (2) analysis and evaluation. The objective of the inventory phase is to collect all pertinent data on the watershed and adjacent urban area. The inventory consists of a group of distinct items, which may be thought of as a set of values or measures of value which have varying degrees of relevance for each recreational activity considered. The analysis and evaluation phase of the of relevance for each recreational activity considered. The analysis and evaluation phase of the methodology attempts to define the potential of a small watershed in terms of those recreational activities for which it is best suited and the extent and quality of its natural, scenic, and historical resources. The recreational activities forming the framework of the evaluation are those which lend themselves to short participation periods and are easily accessible, geographically and economically, to the city dweller. The results of these case studies suggest that many small streams may possess medium to high potential for camping, sport fishing, picnicking, the development of a trail system, and some forms of esthetic enjoyment. (Settle-Wisconsin) POWER, POLLUTION, AND PUBLIC POLICY, ISSUES IN ELECTRIC POWER PRODUCTION, SHORELINE RECREATION, AND AIR AND WATER POLLUTION FACING NEW ENGLAND AND THE NATION.

Massachusetts Inst. of Tech., Cambridge. Sea
Grant Project Office.

For primary bibliographic entry see Field 06G.

W73-02299

THE FRAMEWORK FOR ANALYSIS, Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office. For primary bibliographic entry see Field 06G. W73-02300

WATERSHED PROJECT EVALUATION IN-VOLVING MULTIPLE SOCIAL OBJECTIVES, Purdue Univ., West Lafayette, Ind. Dept. of Agricultural Economics. D. M. Byers. M.S. Thesis, January 1972. 301 p. 12 fig, 64 tab.

M.S. Thesis, January 1972. 301 p, 12 fig, 64 tab, 161 ref, 3 append. OWRR B-042-IND (2).

Descriptors: *Multiple-purpose projects, *Flood control, *Optimum development plans, *Project planning, *Recreation, *Small watersheds, *Social aspects, *Decision making, Comprehensive planning, Planning, Sediment control, watersheds, Social values, Economic evaluation, Linear programming.
Identifiers: Public Law 566, West Boggs Creek

This study was an exploration into multiple social goal decision making with reference to small watershed resource planning. A new evaluation method was applied to the Soil Conservation Service program to determine the input data requirements, the information display, and limitation of one approach to the evaluation of public investment projects involving multiple social goals. The study suggested a great deal of complementarity between the flood control activities of S.C.S. and the land management morgram of Activultural Stabetween the flood control activities of S.C.S. and the land management program of Agricultural Stabilization and Conservation Service. It was also found that there may well be significant influences on the downstream areas not included in present plan evaluations. The study also indicated that there may be wide ranges of independence for social goals, before trade-offs are encountered. Other implications included the simultaneous influence of plan activities upon environmental components and the issue of the socially desirable distribution of benefits and cost sharing of watershed ponents and the issue of the socially desirable dis-tribution of benefits and cost sharing of watershed development. The adoption of multiple goal planning models also poses important information questions concerning the measurement of non-valued goals and the manner in which output infor-mation from a model should be presented to the decision makers. (Wiersma-Purdue) W73-02348

REGIONAL MANAGEMENT OF WATER SUPPLY AND WASTEWATER DISPOSAL FACILITIES, North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.

D. A. Okun.

Paper presented at seminar on 'Regional Aspects of Water Protection,' Ban ja Luka, Yugoslavia, May 22-27, 1972, 8 p. OWRR A-055-NC (2).

Descriptors: *Water distribution, *Municipal water, *Sewers, *Regional analysis, *Economies of scale, Water supply, Planning. Identifiers: *Regional planning, *Regional water supply, *Regional sewer systems.

Advantages of regional water supply and waste-water management systems are reviewed, and the integration of these systems is discussed. Manage-ment efficiency, economies of scale, and im-proved operation are cited as arguments for re-gionalization. (Howells-North Carolina)

EVALUATION OF SELECTED ASPECTS OF COMMUNICATION OF WATER RESOURCES RESEARCH INFORMATION AMONG UNIVERSITY RESEARCHERS AND USERS, North Carolina State Univ., Raleigh. Dept. of Adult and Community College Education. J. M. Stewart.
Ph.D Thesis, 1972, 104 p. 7 fig, 16 tab, 20 ref, 2 append. OWRR A-046-NC (4).

Descriptors: *Education, *Publications, *Research and development, *Information retrieval, *Social participation, *Research priorities, *North Carolina. Identifiers: *Information dissemination, *Technology transfer, *Research utilization. *Education, *Publications,

The need for utilization of water resources The need for utilization of water resources research to meet the complex pressures placed on this resource continues to grow. Communication of research information between research workers and those responsible for water resources development and its subsequent use is increasingly important. In North Carolina the Water Resources Research Institute is a major center for water important. In North Carolina the Water Resource's Research Institute is a major center for water resources research. Primary emphasis of the Institute has been directed to research with increasing recognition of the need to examine the communication and use of research findings. A theoretical base for this study was developed from a review of the communication and adoption processes as viewed from three major perspectives: (1) the research development and diffusion perspective, (2) the social interaction perspective, and (3) the problem-solving perspective, provided in the state model for communication of water resources research. Data collected from questionnaires to 154 university researchers and 146 research users in North Carolina were used to examine the following communication problem areas: (1) Institute communication with research-user groups, (2) perception of the Institute by research-user groups, (3) perception of research-user group roles, (4) research-user group interaction, (5) research dissemination and utilization, and (6) public understanding and education needs. Recommendations are made for the implementation of a communication model for water resources research. (Howells-North Carolina)

WATER RESOURCE PLANNING. National Water Commission, Arlington, Va.

Available from the National Technical Informa-tion Service as PB-211 921, \$6.75 in paper copy, \$0.95 in microfiche. National Water Commission Report NWC-EES-72-057, May 1972, 238 p.

Descriptors: *Planning, *City planning, River basin development, *Institutional constraints, Coordination, Systems analysis, Governments, Data collections, *Decision making, Forecasting, Financing, *Future planning (Projected), Jurisdic-tion.

Identifiers: *Regional planning.

This report and supporting study are based on the collective experience of Panel members. In an outline of the evolution of water planning, roles of planning bodies are delineated and the lack of coordination between river basin and urban planning is noted. Planning is defined, and the interrelationships of water resources planning to other sectors of planning, to functions within the water resources sector, to jurisdictional areas and to stages of planning are examined. Institutional factors which inhibit good planning are discussed, including inadequate definition of goals, agency conflicts, financing constraints, inadequate public participation, and legal constraints. Based on defined criteria for effective planning, the Panel makes a number of recommendations, including changes in the Water Resources Council and reorganization at Federal, state, and regional levels. (NWC)

W73-023

LUTION America For prim

A MIX PROACI SOURCI Utah Sta For prim W73-025

FOR P Texas U ing. For prim W73-025

MODEL

EVALUA Wiscons gineering WATER

Californi mento. For prim W73-025 ECONO

WATER Iowa Un

For prim W73-025

THE EF DUSTRI and Eco For prim W73-025

A RE-E POOL P Louisian Rouge. For prim W73-019

6C. C

INVENT RATE S New Me Universi A. Randa Available tion Serv \$0.95 in tion Rese

Descripto *Industri sumption users, W

W73-02368

TOWARD EFFECTIVE AND EQUITABLE POL-LUTION CONTROL REGULATION, American Management Association, New York. For primary bibliographic entry see Field 05G.

MIXED INTEGER PROGRAMMING AP-A MIXED INTEGER PROGRAMMING AP-PROACH TO PLANNING MULTIPLE WATER SOURCES FOR MUNICIPAL WATER SUPPLY, Utah State Univ., Logan. Coll. of Engineering. For primary bibliographic entry see Field 06A. W73-02540

MODELING AND SENSITIVITY ANALYSIS FOR PLANNING DECISIONS IN WATER RESOURCES EXPANSION, Texas Univ., Austin. Dept. of Chemical Engineer-

For primary bibliographic entry see Field 04A.
W73-02541

EVALUATING ECONOMY OF SCALE, Wisconsin Univ., Madison. Dept. of Civil Enary bibliographic entry see Field 05D.

WATER ECONOMICS, California State Dept. of Water Resources, Sacra-

ary bibliographic entry see Field 04B. W73-02543

ECONOMIC ANALYSIS OF ALTERNATIVE WATER POLLUTION CONTROL MEASURES, lowa Univ., lowa City. Dept. of Economics. For primary bibliographic entry see Field 05G. W73-02550

THE EFFECT OF WATER RESOURCES ON IN-DUSTRIAL GROWTH IN THE TENNESSEE

DUSTRIAL GROWTH IN THE TENNESSEE VALLEY REGION,
Tennessee Univ., Knoxville. Center for Business and Economic Research.
For primary bibliographic entry see Field 03E.
W73-02562

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

RE-EXAMINATION OF THE COMMON

A RE-EXAMINATION POOL PROBLEM,
Louisiana Water Resources Research Inst., Baton For primary bibliographic entry see Field 04B. W73-01956

INVENTORY OF WATER DIVERSIONS AND RATE STRUCTURES FOR CITIES, TOWNS, AND VILLAGES IN NEW MEXICO,

New Mexico Agricultural Experiment Station,

University Park.
A. Randall, and J. Dewbre. A. Kandau, and J. Dewore. Available from the National Technical Informa-tion Service as PB-213 176, \$3.00 in paper copy, \$9.95 in microfiche. Agricultural Experiment Sta-tion Research Report 241, Las Cruces, New Mex-ico, 1972, 50 p., 4 tab., 3 append. OWRR - A-036-NMEX (1).

Descriptors: "New Mexico, "Municipal water, "Industrial water, "Domestic water, Water consumption, Water costs, Water pricing, Water users, Water rates, Water utilization, "Diversion, "Cities, Human population.

Identifiers: *Rate structures, Cooperative water systems, Private water systems, Water diversions per capita day, Water system ownership.

per capita day, Water system ownership.

Information is presented on water rates and diversions for cities, towns, and villages in New Mexico, for the 1970 calendar year. In all, 325 water systems were identified and data are presented for 302 of these systems. The 23 systems for which information is unavailable are known to serve mostly small populations. Water systems in New Mexico vary widely in size, and three types of ownership are common — municipal, cooperative, or private. Rates and diversions for systems of different sizes and ownership types were examined. Median rates and median diversions were also determined for systems of different sizes and different ownership types. The rates varied widely among system ownership types, but much of the variation is probably due to factors other than the cost of supplying water. Median diversions also varied with size and ownership type of the systems. The systems provided water primarily for domestic purposes and in lesser amounts for commercial, industrial, and institutional use of water is greatest in municipal water systems and private systems that serve larger towns or areas close to municipalities. This information is exwater is greatest in minimizal water systems and private systems that serve larger towns or areas close to municipalities. This information is ex-pected to be valuable to planners and researchers working on problems of social and economic development and natural resource use in New Mexico. (Creel-New Mexico State) W73_01963

THE EFFECTS OF SEWER SURCHARGES ON THE LEVEL OF INDUSTRIAL WASTES AND THE USE OF WATER BY INDUSTRY, North Carolina Water Resources Research Inst.,

For primary bibliographic entry see Field 05G. W73-02115

ECONOMIC LIMIT FOR THE AMOUNT OF RESERVE CAPACITY ON CONSTRUCTION OF SEWAGE TREATMENT PLANTS FOR RAPIDLY GROWING MUNICIPALITIES, Hannover. Technische Universitaet, Hanover (West Germany). Institut fuer Siedlungswasser-For primary bibliographic entry see Field 05D. W73-02211

CLOSING THE GAP IN WASTE MANAGE-MENT,

MEN1, Resources For the Future, Inc., Washington, D.C. For primary bibliographic entry see Field 05D. W73-02215

POLLUTION CLEANUP COSTS NAILED For primary bibliographic entry see Field 05G. W73-02283

COST OF PUBLIC WATER SERVICE IN OHIO, Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology. W. F. Lee, and M. H. Cosgrove.
Ohio Report on Research and Development, Vol

57, No 3, p 42-44, May-June, 1972. 1 fig.

Descriptors: *Water supply, *Operating costs, *Costs, Economies of scale, Surface water, Groundwater, *Ohio.

The results of a study of the cost structure of 79 public water systems in Ohio cities are summarized. The populations served by these systems ranged from 5,000 to 1,800,000. The average annual cost of operating the municipal water systems for all cities was \$692,000, with the range extending from \$33,000 to \$15,431,000. The average

operating cost per million gallons of water ranged from \$93.70 to \$596.40, with an average of \$229.46 for all cities. Thirty-eight of the cities obtained water from surface sources, 41 cities used ground sources, and 6 cities used both sources. Two im-portant aspects of the cost of public water service were illuminated by the study. First, there are significant economies of scale in water production. The average cost of water service declines rapidly over the lower range of output and then levels off as output increases beyond one billion gallons per year. Second, the cost of water obtained excluyear. Second, the cost of water obtained exclusively from surface sources exceeds the cost of water obtained exclusively from ground sources by an average of \$39 per million gallons. The existence of economies of scale suggests that small cities could enjoy substantial savings by consolidating their water systems whenever possible. (Settle-Wisconsin)

PRINCIPLES AND PROBLEMS OF MUNICIPAL PINANCING

Journal of the American Water Works Associa-tion, Vol 64, No 6, p 343-350, June, 1972.

Descriptors: *Local governments, *Investment, *Facilities, Financing, Bond issues, Interest rates, Pollution abatement, Taxes. Identifiers: *Public investments, *Municipal bonds, Voter resistance.

Over the next decade local governments will be faced not only with meeting demands for such traditional public facilities as schools, highways, and parks, but also with a host of new demands for facilities associated with environmental control, the redevelopment of cities, and the rehabili the redevelopment of cities, and the rehabilitation and expansion of urban transit systems. Pollution control alone may require an outlay of tens of billions of dollars. Consequently, local governments can anticipate a massive need for revenues. During the 1960's state and local governments financed nearly one third of their investment in public improvements through increased debt. However, the executives of the executives of the respective specific demands for magnitude of the prospective credit demands for the 1970's suggests that the municipal bond market may not be able to accommodate the demand without a further increase in interest rates. Many municipalities are currently paying the maximum interest allowed by law. Consequently, before higher interest rates can be offered, legislative action may be necessary. Furthermore, to the extent that increased debt servicing charges require an in-crease in taxes, voter resistance to bond referenda can be expected to increase. The need for bank capital and expertise in broadening the market for municipal revenue bonds is also discussed. (Settle-

THE ECONOMICS OF AUTOMATION IN

MASTEWATER TREATMENT,
Environmental Protection Agency, Cincinnati,
Ohio, Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 05D.
W73-02293

SEWER SURCHARGES AND THEIR EFFECT ON WATER USE, North Carolina State Univ., Raleigh. Dept of Economics. For primary bibliographic entry see Field 05G. W73-02295

RATE DESIGN AND COST OF SERVICE, Brown and Caldwell, Alhambra, Calif. J. C. Luthin. Journal of the American Water Works Associa-tion, Vol 64, No 6, p 338-342, June, 1972. 1 fig. 5

Field 06-WATER RESOURCES PLANNING

Group 6C—Cost Allocation, Cost Sharing, Pricing/Repayment

Descriptors: *Public utilities, *Costs, *Rates, Descriptors: "Paule United, Costs," Raics, Financial feasibility.
Identifiers: "Rate design, "Charges, "Rate structure, Financial requirements, Customers, Residential users, Industrial users, Commercial

Several parameters comprise the rate design of utilities. These parameters include (1) the role of rate making as part of the general financial program of a utility, (2) the elements of revenue requirements, and (3) cost-of-service studies as an aid in allocating costs to classes of customers. A somewhat oversimplified approach to rate making is to consider the residential, commercial, and industrial groups of customers as three markets, each having a separate average unit cost of service. The unit costs are obtained from cost-of-service studies which allocate revenue requirements to the three functional cost components (commodity, demand, and customer) and then apportion these requirements to the three classes of customers. A single three-block rate schedule of tion these requirements to the three classes of customers. A single three-block rate schedule of declining rates is highest for residential customers because of their low load factor and lowest for industrial users, with their more favorable load factor. The use of a single schedule with three rate blocks forces the commercial and industrial users to pay higher rates before reaching the block rate designed for their class, but this procedure does not produce objectionable distortion or discrimination. Special rates within a customer class can be justified. (Settle-Wisconsin)

USER CHARGES AS A MEANS FOR POLLU-TION CONTROL: THE CASE OF SEWER SURCHARGES, North Carolina State Univ., Raleigh.

For primary bibliographic entry see Field 05G. W73-02359

SEWER SURCHARGES AND THEIR EFFECT ON WATER, North Carolina State Univ., Raleigh. Dept. of For primary bibliographic entry see Field 05G. W73-02360

EVALUATING ECONOMY OF SCALE. Wisconsin Univ., Madison. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D. W73-02542

6D. Water Demand

INVENTORY OF WATER DIVERSIONS AND RATE STRUCTURES FOR CITIES, TOWNS, AND VILLAGES IN NEW MEXICO, New Mexico Agricultural Experiment Station, University Park.
For primary bibliographic entry see Field 06C.
W73-01963

ASSESSMENT OF TURBIDITY, COLOR, AND

ODOR IN WATER, Anacapa Sciences, Inc., Santa Barbara, Calif. For primary bibliographic entry see Field 05G. W73-01971

WATER FOR THE WEST, California State Dept. of Water Resources, Sacra-Journal of the American Water Works Associa-tion, Vol 62, No 4, p 241-244, April 1970, 2 ref.

Descriptors: *Semiarid climates, Water reuse, Desalination, *Weather modification, *Water demand, *Water supply.

Population in the western states is increasing at twice the national rate and is projected to continue until the year 2020. The water supply needed to serve this population will reach 375 million acree the annually. To develop this supply, wastewater reclamation, desalination, weather modification and water conservation offer potential as sources. With proper research and planning, the foreseeable water needs can be reached with sufficient quality. (Kruse-AWWARF) Population in the western states is increasing at

THE CENSUS AND WATER UTILITIES, Bureau of the Census, Washington, D.C. Popula-

Journal of the American Water Works Associa-tion, Vol 63, No 9, September 1971, p 571-575, 1 fig, 4 tab, 7 ref.

Descriptors: *Census, *Human population, Urbanization, Water management (Applied).

The 1970 census of population and housing gathered considerably more information than the 1960 census and these data are available on tape to provide greater flexibility of use. In the next ten years a 30 million population increase, very largely concentrated in metropolitan areas, coupled with an unusually large increase in family formations, can be anticipated. Trends of the 1960's may continue, including smaller household size, black migration from the south to the north and west, heavy growth of suburban areas, an increase in multi-family dwelling units, and increased housing costs. These growth patterns challenge local governments, developers, and utilities. (Weir-AW-WARF) W73-02136

PRINCIPLES AND PROBLEMS OF MUNICIPAL FINANCING, For primary bibliographic entry see Field 06C. W73-02289

SEWER SURCHARGES AND THEIR EFFECT ON WATER USE, North Carolina State Univ., Raleigh. Dept of For primary bibliographic entry see Field 05G. W73-02295

THE CRISIS IN SHORELINE RECREATION, Massachusetts Inst. of Tech., Cambridge, Sea Grant Project Office. For primary bibliographic entry see Field 06G. W73-02302

SEWER SURCHARGES AND THEIR EFFECT ON WATER, North Carolina State Univ., Raleigh. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W73-02360

THE INDUSTRIAL DEMAND FOR WATER AND WASTE TREATMENT IN SELECTED U.S. CITIES WHICH ARE LEVYING SURCHARGES, North Carolina State Univ., Raleigh. Dept. of For primary bibliographic entry see Field 05G. W73-02361

ALTERNATIVE DEMANDS FOR WATER AND LAND FOR AGRICULTURAL PURPOSES, Iowa State Univ., Ames. Center for Agricultural and Rural Development. H. C. Madsen, E. O. Heady, S. H. Hargove, and

Available from the National Technical Informa-tion Service as PB-211 444, \$4.85 in paper copy,

\$0.95 in microfiche. National Water Commission Report NWC-F-72-054, June 1972, 92 p. NWC 72-012.

Descriptors: Linear programming, Fertilizers, Agricultural chemicals, Irrigated land, Mathematical models, *Forceasting, *Water consumption, Land use, Water policy, *Water demands, Model Identifiers: *Alternative futures, Land and water

policy, Land and water use, Soy protein meats.

This study evaluates the impact on land and water needs and farm prices if either (1) soy protein meat analogs and extenders were substituted for part of the beef consumption in the year 2000 or (2) nitrogen fertilizer application in the year 2000 or erestricted to (a) 110 pounds per acre and (b) 50 pounds per acre and to) 50 pounds per acre and to so protein meats policy models indicate that with soy protein meats policy models indicate that with soy protein meats accepted by consumer, productive capacity of U.S. agriculture would surpass any level previously experienced in this nation. Results of the two fertilizer limitation policy models indicate that a mild restriction of the use of nitrogen fertilizer would not strain the productive capacity of U.S. agriculrestriction of the use of nitrogen fertilizer would not strain the productive capacity of U.S. agriculture. A severe restriction, however, would reduce the supply capacity of U.S. agriculture considerably. (NWC)
W73-02363

6E. Water Law and Institutions

WATER QUALITY MANAGEMENT, AN ANAL-YSIS OF INSTITUTIONAL PATTERNS, Iowa Univ., Iowa City. Dept. of Urban and Re-For primary bibliographic entry see Field 05G. W73-01978

ADMINISTERING STATE RESOURCES: THE NEED FOR LONG RANGE

PLANNING, F. E. Maloney, and R. C. Ausness. West Virginia Law Review, Vol 73, p 209-230, 1971. 109 ref. OWRR A-009-FLA (4).

Descriptors: *Water supply development, *Water allocation (Policy), *Water resources development, *Water distribution (Applied), *Planning, Adoption of practices, Riparian rights, Legal aspects, Water rights, Administrative agencies, Prior appropriation, Water law, Water permits, Regulation, Legislation, State jurisdiction, Water demand, Water importing, Competing uses, Water consumption (Except consumptive use), Water management (Applied). Identifiers: *Model Water Code.

Proper state water resource planning should in-clude centralized responsibility, scientific planning, coordination of water quality and con-sumptive use planning, and regulation of con-sumptive use as a planning tool. The respective ad-vantages and disadvantages of riparianism and prior appropriation as long range consumptive use planning tools are discussed. Prior appropriation tends to freeze water in uses which are not neces-sarily the best, and riparianism results in uncer-tainty. Administrative control is a more useful tainty. Administrative control is a more useful planning tool because decisions are made prior to disputes, the public interest and all uses are considered, and the decision-makers, unlike judges, are experts. The recently drafted Model Water Code, which is designed to bring about coordinated state water resource planning and control through an administrative structure, is discussed. Objectives of the plan include maximum reasonable beneficial uses of water, economic development of water resources, and control of state waters for navigation and sanitation. Regulation of water use remains a primary state function. State water use remains a primary state function. State

planning a frequently planning (C W73-01979

PROPOSEI TAIN WAT AND YADI CONSIDER HELD ON PINES, NO North Car Resources, trol Commit For primary W73-01983

REVISION RIVER BA MENT. Water Reso For primary W73-01992

VIRONME: House, Was J. S. Monag Congression (daily ed) Se Descriptors resources, Pollution o Recreation, quality confluents, Wa alternatives Identifiers: of 1963, * Restoration Standing (L

Although th ficiently rec are not of discusses h sional Com troduced, o vironmenta ustry must will approaunit. An a Reed-Flori W73-01993

PROPOSEI FOR PLA Water Reso Available f

tion Service \$0.95 in mic 3 map, 9 tab

Descriptors *Water rese policy, *En Land use, Costs, Hun Project bene Identifiers: of 1969.

To further mental Poli Council pro followed in resources of planning and resource management agencies frequently fail to accomplish any meaningful planning (Grant-Florida) W73-01979

PROPOSED RECLASSIFICATIONS OF CER-TAIN WATERS IN THE CAPE FEAR, LUMBER, AND YADKIN-PEE DEE RIVER BASINS TO BE CONSIDERED AT A PUBLIC HEARING TO BE HELD ON NOVEMBER 2, 1972, IN SOUTHERN PINES, NORTH CAROLINA. North Carolina Board of Water and Air Resources, Raleigh. Water and Air Quality Con-trol Committee.

For primary bibliographic entry see Field 05G. W73-01983

REVISION OF COMPLETED REGIONAL OR RIVER BASIN PLANS, A POLICY STATE-

Water Resources Council, Washington, D. C. For primary bibliographic entry see Field 06B. W73-01992

REPAIR AND PROTECT OUR NATURAL EN-

NETAIR AND THE CONTROLL OF T

Descriptors: *Environmental effects, *Natural resources, *Pollution abatement, *Legislation, Pollution control, Legal aspects, Water law, Recreation, Future planning (Projected), Water quality control, Sewage treatment, Sewage effluents, Water pollution control, Non-structural

Identifiers: *Federal Water Pollution Control Act of 1963, *Refuse Act of 1899, *Clean Water Restoration Act, *Federal Water Pollution Act,

Standing (Legal).

Although the developing United States did not suf-ficiently recognize man's environmental rights, activities directed at preserving its natural resources are not of recent origin. Congressman Monagan discusses his participation in various Congressional Committees, and mentions legislation he instoduced, or supported, dealing with control of en-vironmental pollution. Large businesses and in-dustry must share the responsibilities of pollution austry must snare the responsibilities of pollution abatement. Programs must be developed which will approach the environment as an integrated unit. An anticipatory capability to prevent environmental tragedies ought to be developed. (Reed-Florida)
W73-01993

PROPOSED PRINCIPLES AND STANDARDS FOR PLANNING WATER AND RELATED LAND RESOURCES. ater Resources Council, Washington, D.C.

Available from the National Technical Informa-tion Service as PB-209 187, \$3.00 in paper copy, \$0.95 in microfiche. December 21, 1971. 49 p, 1 fig, 3 map, 9 tab, 1 chart.

Descriptors: "Legislation, "Project planning, "Water resources development, "Federal project policy, "Environmental effects, Water resources, Land use, United States, Federal government, Costs, Human population, Regulation, Projects, Project benefits, Alternate planning. Identifiers: "National Environmental Policy Act

To further the purposes of the National Environ-mental Policy Act of 1969, the Water Resources Council proposed principles and standards to be followed in planning the use of water and land resources of the United States. Plans for the use of

resources would be directed toward the improve-ment of the quality of life through contributions to the objectives of national economic development, eavironmental quality and regional development. Each plan must be accompanied by a complete ac-counting of its relevant beneficial and adverse ef-fects, measured in monetary, economic, social, demographic and eavironmental terms. demographic and environmental terms. The proposal details the steps involved in assuring that proposal details the steps involved in assuring that plans for the use of resources "will be directed to improvements in the quality of life by meeting cur-rent and projected needs and problems". For each alternative plan there will be a complete display or accounting of relevant beneficial and adverse ef-fects. Bestimating these beneficial or adverse ef-fects is undertaken i n order to measure the net changes with respect to particular objectives that are generated by alternative plans. These princi-ples and standards would apply to: (1) federal par-ticipation with river basin commissions, (2) states and others in the formulation and transmission to the Congress of plans, and (3) for the planning of federal and certain federally assisted water and land resource programs. (Reed-Florida)

REPORT TO THE WATER RESOURCES COUN-CIL BY THE SPECIAL TASK FORCE, FINDINGS AND RECOMMENDATIONS. ter Resources Council, Washington, D.C.

Available from the National Technical Information Service as PB-209 174, \$3.00 in paper copy, \$0.95 in microfiche. July 1970. 21 p, 26 ref.

Descriptors: *U.S. Water Resources Council, *Federal project policy, *Adoption of practices, *Future planning (Projected), *Project planning, Administrative decisions, Water resources development, Water management (Applied), Administrative agencies, Decision making, Federal government, Planning, Environmental effects, Social aspects, Water policy, Cost analysis, Cost benefit analysis, Cost sharing.

In response to public and Congressional concern and dissatisfaction with existing guidelines, the Water Resources Council has reviewed the evaluation practices currently used by federal agencies in regional or river basin planning and in planning federal water and related land projects. A Special federal water and related land projects. A Special Task Force prepared a report on this review that was approved by the Council in 1969. The proposed revisions will be effective following publication in the Federal Register and Presidential approval. Included is a summary analysis of the nineteen proposed evaluation procedures. The proposed evaluation procedures are keyed to multiobjective planning with four objectives: national economic development environmental itional economic development, environmental quality, social well-being, and regional development. The costs of planning with this new system may be higher compared with the old system, however, the basis for decisions should be ubstantially improved. Planning in the future must give explicit recognition to important values that have gone un-recognized in the past. (Brackins-Florida) W73-02232

LOUISIANA IRRIGATION AND MILL CO. V. POUSSON (INJUNCTIVE RELIEF TO PRO-TECT AND AQUEDUCT SERVITUDE). 265 So. 2d 756-764 (La. 1972).

Descriptors: *Louisiana, *Easements, *Irrigation Descriptors: *Louisiana, *Easements, 'Irrigation canals, *Watercourses (Legal aspects), Judicial decisions, Aqueducts, Water conveyance, Legal aspects, Legislation, Lateral conveyance structures, Irrigation, Water distribution (Applied), Water rights, Land development, Land use, Water supply development, Water allocation (Policy), Water transfer, Water utilization, Prescriptive rights. Identifiers: *Injunctions (Prohibitory), Estoppel.

Plaintiff irrigation company sought an injunction to prohibit defendant landowner from interfering with an aqueduct servitude used by plaintiff for irrigation. The canal involved in the litigation crossed defendant's land, although plaintiff had used it to irrigate rice crops for many years until 1967. Plaintiff did not use the canal from 1967 until 1967. Plaintiff did not use the canal from 1967 until May of 1969. However, after eleven months defendant usurped the canal from plaintiff, in March of 1970. Plaintiff contended that defendant had disturbed his rights of possession; defendant answered by alleging that he was the owner and possessor of all canals over his land. The Supreme Court of Louisiana held that before an injunction can be obtained under the statute relied on, the plaintiff must have been in possession of the serplaintiff must have been in possession of the ser-vitude for a year prior to the interference. The court ruled that defendant's usurpation of the court ruses that detendant's usurpation of the canal resulted in a loss of possession by plaintiff and therefore plaintiff was not entitled to an injunction because it had not been in possession of the servitude for one year preceding the disturbance. (Brackins-Florida) W73-02236

DISCON V. SARAY, INC. (ACCESS RIGHTS OF LANDOWNERS BORDERING NAVIGABLE CANAL).

265 So. 2d 765-777 (La. 1972).

Descriptors: *Louisiana, *Navigable waters, *Canals, *Right-of-way, *Judicial decisions, Inlets (Waterways), Marinas, Legislation, Legal aspects, Legal review, Public access, Riparian land, Riparian rights.
Identifiers: *Injunctions (Prohibitory).

Plaintiff landowners sought to enjoin defendant, Plaintiff landowners sought to enjoin defendant, adjacent owner of property, from obstructing passage through the canal, on which plaintiffs also owned bordering property. The canal, in which defendant was building a marina, was part of a subdivision development and provided access to a neighboring lake. Plaintiffs argued that the planned development was prohibited by a statute making the obstruction of a highway of commerce a crime. The defendant developer contended that the canal was not navigable in law, that an alternate route existed that the nasageway was a ternate route existed, that the passageway was a servitude subject to relocation and that permission was granted by various federal, state and parish agencies. On certiorari, the Supreme Court of Louisiana, reversing the decision of the Court of Appeals, held for the plaintiffs and found that the canal, since it was actually being used for commercial purposes, was navigable. The court noted that the statute did not permit a violation because of the availability of an alternate route, and that the passageway was not a servitude but a right-of-The court also noted that the various agencies had not given their permission, but had merely not indicated any objection to defendant's proposals. The court held that the owner of propropersians. The court from that the owner of pro-perty on both sides of a canal could not so obstruct the canal as to prevent its use as a means of ingress and egress to a neighboring lake. (Reed-Florida) W73-02237

SIERRA CLUB V. FROEHLKE (JUDICIAL REVIEW OF ENVIRONMENTAL IMPACT STATEMENT).

345 F. Supp. 440-447 (W.D. Wis. 1972).

Descriptors: *Environmental effects, *Judicial decisions, *Project planning, *Administration, Wisconsin, Legislation, Flood control, Administrative agencies, Construction, Contracts, Regulation. Dam construction. Identifiers: *Injunctions (Mandatory), *National Environmental Policy Act.

Plaintiff environmental protection association sought a preliminary injunction enjoining defen-

Field 06-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

dant Secretary of the Army from opening or awarding contracts for construction, undertaking land purchases, or other activities relating to a proposed flood control project. Congress authorized construction of a dam and an environmental impact statement was completed on the project. Plaintiff challenged the adequacy of the statement and alleged bias on the part of the preparing agency. The United States District Court for the Western District of Wisconsin held that in order to grant a preliminary injunction a plaintiff must show a substantial probability of success on the merits of its claims and that mere allegations that all alternatives have not been considered, and that all relevant information has not been compiled are not sufficient to demonstrate such a probability. The court also held that respecting claims of noncompliance with the Flood Control Act of 1962, deviation from Congressional authorization, and miscalculation of the benefit-cost ratio, plaintiff had failed to show a sufficient chance of success on the merits. (Nielson-Florida)

GREGORY V. CITY OF NEW YORK (NON-R-ESIDENT RIPARIAN LANDOWNER'S FOR UP-STREAM DIVERSION BY MUNICIPALITY).

346 F. Supp. 140-145 (S.D. N.Y. 1972).

Descriptors: *Municipal water, *Diversion, *Judicial decisions, *Riparian rights, Alteration of flow, Riparian waters, Natural flow doctrine, Competing uses, Domestic water, Reasonable use, Recreation, Boating, Fishing, Swimming, Riparian land, Legal aspects, State governments.

Plaintiff out-of-state riparian landowner sued for damages in continuing trespass of his riparian and water rights by defendant municipality. The action arose after municipality began permanent diversion of waters from the river several miles upstream from plaintiff's land. This allegedly had an adverse effect upon boating, fishing and swimming in the Delaware River. Plaintiff's land was located in Pennsylvania while defendant municipality was in New York. The United States Southern District Court of New York dismissed the complaint. The applicable state administrative code provision relating to compensation of riparian owners, permitting three years in which to commence the action, did not apply to non-residents. The court noted that the plaintiff must bring the action under New York's general municipal law section applicable to tort claims, imposing a 90-day notice provision and 190 day statute of limitation. The court held that restricting the plaintiff to the lesser statute of limitation was not a denial of equal protection. (Nielsen-Florida)

MINNESOTA POLLUTION CONTROL AGEN-CY V. HATFIELD (PUBLIC EXPENDITURES FOR WATER POLLUTION ABATEMENT AS A LEGITIMATE PUBLIC PURPOSE). 200 N.W.2d 572-576 (Minn. 1972).

Descriptors: "Minnesota, "Judicial decisions, "Water pollution control, "Financing, Legislation, Legal aspects, State jurisdiction, Economics, Bond issues, Government finance, Administrative agencies, State governments, Constitutional law, Public health.

Defendant state auditor appealed the decision of the trial court upholding the constitutional validity of a statute which provided state financial assistance for the construction of water pollution prevention and abatement facilities for municipal disposal systems. Defendant had refused to issue bonds at plaintiff agency's request claiming that the statute violated the state constitution by permitting the state to expend funds for internal improvement works. Defendant further claimed that

the statute did not distinctly specify the purpose for the bonds issuance and also that the statute was an improper delegation of authority to plaintiff. The Supreme Court of Minnesota held that within the meaning of the constitution, works of internal improvement do not include works constructed for the betterment of public land, buildings, and improvements of a capital nature needed for the prevention, control, and abatement of water pollution. The court ruled that the statute in question was designed to help alleviate water pollution and that water pollution abatement was a matter of public health and necessarily a legitimate function for expenditure of public money. The court also ruled that the statute sufficiently stated the purpose for the bonds and that the statutory delegation of authority to plaintiff was proper. (Nielsen-Florida)

SPAIN V. CAPE GIRARDEAU (SURFACE WATER DAMAGE CAUSED BY STREET RE-SURFACING). 484 S.W.2d 498-506 (Mo. Ct. App. 1972).

Descriptors: "Missouri, "Drainage practices, "Drainage effects, "Road construction, Drains, Local governments, Roads, Road banks, Effects, Damages, Judicial decisions, Water law, Common law, Civil law, Diversion, Legal aspects, Land tenure.

Identifiers: "Nuisance (Legal aspects).

Plaintiff landowner sued for damages caused by surface water damage to his property. Prior to plaintiff purchasing the property, defendant city resurfaced an adjacent street which allegedly increased water flow beyond drainway capacity, thereby spilling water onto plaintiff's property. On appeal defendant contended, inter alia, that the lower court's instruction imposed absolute liability on defendant contrary to law and that the nuisance was permanent and had existed prior to plaintiff's purchase and that plaintiff was not entitled to damages. Plaintiff contended that the nuisance was temporary and abatable therefore entitling him to damages. The Missouri Court of Appeals held that a landowner can be liable for damage caused by his collecting and casting off of surface water only upon a showing of negligence and that the natural capacity of the drainway has been exceeded. The court also held that a nuisance which arises from negligence, and which may be reasonably abated, is not of permanent character so as to preclude a subsequent purchaser from maintaining an action, but rather constitutes a temporary nuisance for which damages to the value of the property are recoverable. (Ellis-Florida) W73-02241

THE PROBLEMS AND ISSUES OF IMPLE-MENTING NATIONAL WATER LEGISLATION AT SUBNATIONAL LEVELS, Oregon State Univ., Corvallis. Dept. of Geography. K. W. Muckleston. OWRR A-005-ORE (2), (1971), 5 p. 3 ref.

Descriptors: "Water resources development, "Future planning (Projected), "Cost-sharing, "Legislation, Federal-state water right conflicts, Adminitration, Legal aspects, Recreation, Administrative agencies, Comprehensive planning, State governments, Federal government. Identifiers: "Federal Water Project Recreation Act, "Long term debts.

The Federal WaterProject Recreation Act, passed in 1965, recognizes that man has the technological and political means to improve selected aspects of his biophysical surroundings. By focusing on the implementation of this Act, the problem of fitting national water legislation to subnational levels is illustrated. Several provisions of the Act render its implementation difficult. Non-federal entities are

required to assume long term debts and pay for part of recreational enhancement programs. An analysis made six years after the Act's passage revealed that the problems were perceived differently by the various federal and state agencies. The federal agencies believed the most formidable obstacle to be the high cost of participation; however, the states blamed unsuitable project locations, poor timing, and constitutional debt prohibitional restrictions have been circumvented by the non-federal agencies when they have desired to participate in the Act. Several instances are examined in which state laws have effectively impeded implementation of the Act. State agencies are dissastisfied with their input in planning programs. Other obstacles to implementation include counties that do not wish to provide recreation for non-county residents and intervening recreational opportunities. (Reed-Florida)

CHRISTOFFELS V. ALTON PROPERTIES, INC. (PRIVATE SUITS BARRED UNDER STATE STATUTE PERTAINING TO FILLING IN OF LAKES).

285 N.E.2d 453-454 (Mass. 1972).

Descriptors: *Massachusetts, *Legislation, *Judicial decisions, *Law enforcement, Water law, Legal aspects, Judicial decisions, Water resources development, Ponds, Public rights, Lane use, Constitutional law, Water policy, Water rights, Remedies, Landfills. Identifiers: *Private citizen suits, Mandamus.

Plaintiff landowners sought to enjoin the filling of a pond in the town and the construction of a shopping center thereon by defendant developers. The pond could lawfully be filled only under the terms of a state statute. Plaintiffs contended that the statute was unconstitutional because it afforded them no opportunity to be heard prior to the issuance by the Department of Natural Resources of an order for conditions under which the pond shall be filled. The Supreme Judicial Court of Massachusetts held that the statute protects only the public interest and confers no enforceable rights on private individuals. The court ruled that the statute does not preclude proceedings under other environmental protection statutes nor does it preclude sait by private individuals to free public officers to perform their duties. (Brackins-Florida) W73-02243

CONRAD V. BOARD OF SUPERVISORS OF LEE COUNTY (EXTENT OF LIABILITY FOR POLLUTION OF PRIVATE POND).

199 N.W.2d 139-144 (Iowa 1972).

Descriptors: *Iowa, *Water pollution effects, *Damages, *Water pollution sources, Water pollution, Water Iaw, Legal aspects, Judicial decisions, Surface runoff, Path of pollutants, Odor, Water rights, Negligence, Artificial lakes, Impounded waters, Pollutants.

Plaintiff landowner sued defendant county for pollution of a pond that plaintiff had constructed. Defendant had placed tree sap (lignin sulfite) on an adjacent road. Following a rain, plaintiff alleged the tree sap drained into his pond causing the pond to become brown and maloddorous. Defendant contended the use of the tree sap was justified by its statutory duty to maintain the roads and furthermore that plaintiff knew of past use of the tree sap and was therefore contributorily negligent. The Lowa Supreme Court held that for a landowner to recover for alleged pollution of his pond, it was necessary to prove what needed to be done to restore the pond to its previous condition and the reasonable cost of restoration. The court reversed

the lower to prove to remove the Moreover the difference pollution of W73-02244

MCCART (LIABILLI WATER D 199 N.W.2

Descriptor drainage, downers, Flooding, Water law struction, Identifiers Jury instru

Plaintiff la contractor drainage o to construct drainage o to construct However, mencemen by defen problems. level of heach rain. performing specification specification and trailing upon a la larger quan naturally for architect notions. Fur damages si rionally, which was sufficed architect of the second problems of the

ACCIDEN IN STATE 334 N.Y.S.

IN RE JO INC. (JUI ENVIRON

Descriptor cies, *Law cation propollution, ' sources, Ji sions, Wa (Legal asp quality con Petitioner: Departmen conducting leged viola accidentall

of the Stat and violati dards. Petit tive comple abate exist health law, for a const thus was in risdiction a was void for Court for A tive body he and that ev would not it tioner had The court plaint. (Bra the lower court by holding that plaintiff had failed to prove that it was necessary to drain the pond, remove the mud and pack the bottom with clay. Moreover plaintiff could not recover more than the difference in value of the land before and after pollution of the pond. (Brackins-Florida) W73-02244

MCCARTHY V. CULLEN AND SON CORP. (LIABILITY FOR ALTERATION OF SURFACE WATER DRAINAGE). 199 N.W.2d 362-373 (Iowa 1972).

Descriptors: *Iowa, *Drainage effects, *Surface drainage, *Judicial decisions, Adjacent landowners, Alteration of flow, Drainage practices, Flooding, Drainage engineering, Legal aspects, Water law, Damages, Negligence, Land use, Construction, Surface runoff, Surface waters, Identifiers: Intentional torts, Punitive damages, Jury instructions, Indemnification.

Plaintiff landowner sued defendants, construction contractor and architect, for damages caused by drainage of waters from a construction site. Prior to construction plaintiff had no drainage problems. However, during the two years following commencement of construction on adjacent property by defendant, plaintiff had serious drainage problems. Plaintiff was unable to live in the lower level of his home which was flooded following each rain. The Supreme Court of Iowa held that performing work in accordance with plans and performing work in accordance with plans and specifications was no defense where a contractor negligently causes surface waters to be discharged negagently clauses surface waters to be accoranged upon a landowner's property in substantially larger quantities or different manner than it would naturally flow. The court ruled that the evidence was sufficient to support the finding that the architect negligently furnished plans and specificaarcintect negligently furnished plans and specifica-tions. Furthermore, the court allowed punitive damages since the contractor knowingly and inten-tionally, without just cause, persisted in conduct which damaged plaintiff's property by drainage of surface waters. (Brackins-Florida) W73-02245

IN RE JOHNSON ORCHARDS AND FARMS, INC. (JURISDICTION OF DEPARTMENT OF ENVIRONMENTAL CONSERVATION OVER ACCIDENTAL DISCHARGE OF CHEMICALS IN STATE WATERWAY).

334 N.Y.S.2d 267-269 (Sup. Ct. 1972).

Descriptors: *New York, *Administrative agencies, *Law enforcement, *Legal review, *Adjudication procedure, Water quality standards, Water pollution, Water pollution sources, Judicial decisions, Administrative decisions, Water law, Legal aspects, Watercourses (Legal aspects), Legislation, Jurisdiction, Water quality control.

Petitioner sued to enjoin the Commissioner of the Department of Environmental Conservation from conducting administrative proceedings on an alleged violation of a public health law. Petitioner accidentally discharged chemicals into a waterway of the State, which resulted in the killing of fish and violation of duly adopted water quality standards. Petitioner contended (1) that the administrative complaint did not seek to prevent pollution or abate existing pollution in keeping with the public health law, but rather sought to impose a penalty for a consummated act in the nature of a tort and thus was in excess of the administrative body's jurisdiction and (2) that the administrative complaint was void for vagueness. The New York Supreme Court for Albany County held that the administrative body had jurisdiction over the subject matter and that even if the complaint was vague the court would not interfere with the proceedings until petitioner had exhausted his administrative remedies. The court therefore dismissed petitioners complaint. (Brackins-Florida) Petitioner sued to enjoin the Commissioner of the

W73,02246

UNITED STATES V. PENNSYLVANIA INDUSTRIAL CHEMICAL CORP. (DEFENSES TO CRIMINAL PROSECUTIONS UNDER THE REFUSE ACT), 461 F.2d 468-480 (3d Cir. 1972).

Descriptors: "United States, "Rivers and Harbors Act, "Law enforcement, "Legislation, Water law, Legal aspects, Judicial decisions, Water descriptions, Water pollution spects, Lindustrial wastes, Waste disposal, Water quality standards, Water pollution, Pollution abatement, Water pollution control, Water pollution sources, Water Quality Act, Water quality control, Federal Water Pollution Control Act, Navisable rivers, Permits Navigable rivers, Permits. Identifiers: *Refuse Act of 1899.

Defendant corporation appealed from a criminal conviction for the discharge of industrial wastes into a navigable river in violation of section thirteen of the Rivers and Harbors Act (Refuse Act). Defendant's discharges did not impede navigation nor did they violate applicable water quality standards. The United States Third Circuit Court of Appeals held that the Act applied to discharges of refuse matter of any kind, even if navigation was not impeded; that liquid industrial waste flowing through pipes into navigable waters is not exempt from the Act; and that compliance with applicable water quality standards is no defense to prosecuwater quality standards is no defense to prosecu-tion under the Act. The court also ruled that defendant could not be convicted under the Act, if at the time of the discharge, no permit program was in existence, regardless of whether defendant had ever applied for a permit. Moreover, if the Corps of Engineers misled defendant into believing that a permit was not necessary in this situation, it would violate due process to hold defendant criminally responsible in this case. The court reversed and remanded the case to the trial court. (Brackins-Florida) W73-02247

THE DRIVE TO SAVE AMERICA'S SHORELINES.

U.S. News and World Report, p 38-40, July 31, 1972. 7 photo.

Descriptors: *Conservation, *Shores, *Public lands, *Coasts, Administrative agencies, Lake shores, Lake Michigan, Preservation, Environmental effects, Wetlands, Florida, California, Mississippi, North Carolina, Federal government, National lakeshores, National parks.

Efforts by conservationists, with strong backing from government agencies, to preserve un-developed United States shoreline are evaluated. The National Park Service has spearheaded the drive by acquiring choice coastal lakeshore property in ten states. One of the largest shoreline perty in ten states. One of the alagest shoreme properties added to the network is the Gulf Islands National Seashore, stretching 150 miles along the Florida and Mississippi coasts. The islands were riorica and Mississippi coasts. In eislands were dedicated earlier this year as a national seashore. Another new facility, the Redwood National Park in California, has been the center of controversy between conservationists and the lumber industry ever since its establishment. Local residents contend that too much basic resource has been removed from use and predict considerable unem ployment. Conservationists maintain that too many of the redwoods have already been destroyed and that federal protection is necessary. destroyed and that rederal protection is necessary; other sites set aside by federal agencies include Indiana Dunes National Lakeshore on Lake Michigan, and Cape Lookout National Seashore near Morehead City, N.C. Private groups active in preservation are: Nature Conservancy, based in Arlington, Va; and Sierra Club and Coastal Alliance, based in California. (Tolle-Florida)

DEFENDING THE ENVIRONMENT-A CASE HISTORY.

D. Puleston.
Brookhaven Lecture Series, No. 104, September 15, 1971. 17 p, 2 fig, 12 photo, 20 ref.

Descriptors: "Watercourses (Legal aspects),
"Water law, "Judicial decisions, "Law enforcement, Public rights, Legal aspects, Michigan,
Florida, Montana, Alaska, California, Water pollution control, Water policy, Water rights, Polludtion abatement, Water management (Applied),
River regulation, Pesticides, DDT, Dam construction, Channeling, Water resources development.
Identifiers: "Environmental Defense Fund,
Whatea."

Whith the belief that the courtroom was the best channel through which to correct the worst environmental insults, the Environmental Defense Fund (EDF) was founded in 1967. Highlights of litigation involving the EDF include: (1) the case against DDT, (2) the Mosquito Control Commission suit in New York, (3) the early Michigan cases of the Environmental Defense Fund, (4) atmospheric lead pollution in Montana, (5) the Cross-Florida Barge Canal, (6) a number of other river cases, (7) the Trans-Alaska Pipeline System, (8) the Four Corners power complex in Southwestern United States, (9) possible extinction of whales, (10) dumping of army nerve gas, and (11) the pesticide battle. At this point the EDF has a bulging case book and a dedicated staff working under high pressure. The EDF has also developed a more formal procedure for entering a case. (Wheeler-Florida)

ENVIRONMENTAL MANAGEMENT FOR PUGET SOUND: CERTAIN PROBLEMS OF POLITICAL ORGANIZATION AND ALTERNATIVE APPROACHES, Washington Univ., Seattle. Div. of Marine Resources.

washington Univ., Seattle. Div. of Marine Resources. W. H. Spencer. Available from the National Technical Informa-tion Service as COM-72-10323, \$3.00 in paper copy, \$0.95 in microfiche. National Sea Grant Program, WSG-MP71-2, November 1971. 50 p, 33 ref, 1 append.

Descriptors: "Washington, "Water management (Applied), "Administrative agencies, "Decision making, Administration, Environmental effects, Water conservation, Water demand, Water resources, Water supply, Water supply development, Water policy, Water supply development, Environmental control, Local governments, State governments, Regional development, Legislation, Estuaries, Regional analysis, Administrative decisions, Water law, Governmental interrelations. interrelations

Identifiers: *Puget Sound, Washington, *Environmental management, San Francisco Washington Shorelines Management Act.

Alternative means by which the uses of water and the adjacent land of the Puget Sound region of Washington can be organized and managed are described. Included is discussion of environmental described. Included is discussion of environmental policy and management and structural arrangements as they either have been proposed or currently exist in managing water resources. The Puget Sound region is experiencing a continuing period of considerable growth which places heavy land and water use demands on the Sound and produces the need for some kind of management. Included are some general organization criteria, principles and considerations for environmental management; management roles of local, state and federal covernments; regional forms of govern management; management roles of local, state and federal governments; regional forms of government for environmental management; and an in depth examination of the San Francisco Bay area method of environmental management of its water resources. Also discussed are the Shorelines Management Act, passed by the Washington legislature in 1971 and the Shorelines Protection

Field 06-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

Act, an initiative placed on the 1972 general elec-tion ballot. (Wheeler-Florida)

PAVE THE WETLANDS OR LET THEM BE. Kingswood School, West Hartford, Conn. S. P. Davenport, Jr. New York Times (Magazine) p 16-17, January 16,

Descriptors: *Connecticut, *Legislation, *Wetlands, *Land use, Legal aspects, Administrative decisions, Tidal marshes, Water resources decisions, Tidal marshes, Water resources development, Permits, Coastal marshes, Land reclamation, Land development, Constitutional law, Eminent domain, Salt marshes, Estuarine en-vironment, Estuaries, Public rights, Water law. Identifiers: *Connecticut Wetlands Protection Act, Public Trust Doctrine, *Great Salt Meadow

Developers who own the Great Salt Meadow, a vast estuarine marsh in Stratford, Connecticut, are seeking, against intense opposition from conservaseeking, against intense opposition from conserva-tionists, to fill the wetlands for development. One issue in this pending litigation is the Connecticut Wetlands Protection Act which prohibits persons from dredging and filling their own wetlands without permission from the Department of En-vironmental Protection. A hearing on the applica-tion to fill the Great Salt Meadow has already been held with the decision adverse to the developers. Conservationists contend that the state owns all Conservationists contend that the state owns an the land that is covered by high tide, including this estuarine marsh. The developers, on the other hand, point out that they purchased this land in 1948 and have been paying taxes on it. Moreover, if they are denied permission to proceed with development, they will sue for compensation for confiscation of their private property rights. It is likely that the state can not afford to pay just compensation. Thus the crux of the controversy is whether the state or the private developer owns this land, and if the private developer owns it, is it right for the public to prohibit development. (Brackins-Florida) W73-02252

PROMPT PASSAGE OF OCEAN DUMPING BILL IS URGED,

Senate, Washington, D.C. W. V. Roth, Jr.

Congressional Record, Vol 118, p S15576-S15577 (daily ed.) Sept. 21, 1972.

*Waste Descriptors: *Legislation, *Waste dumps, *Pollution abatement, Water law, Legal aspects, United States, Water pollution control, Water pollution sources, Oceans, Coasts, Shores, Water quality control, Delaware, Sewage disposal.

Identifiers: *Coastal waters, *Ocean dumping.

Both houses of Congress have passed the ocean-dumping bill and the conference committee report dumping our and the contented communes report
has been written. Haste is urged in voting on the
conference report in order that work can commence on correcting the damage that has already
been done to the coastal waters by indiscriminate
dumping. Because ocean dumping is an inexpensive, simple solution to the problem of waste
discool address that getter than four. disposal other states dump sewage less than four-teen miles off the coast of Delaware. Under the bill as passed, the Environmental Protection Agency would be required to approve affirmatively any ocean dumping. A prerequisite to Environmental Protection Agency approval would be scientific studies to ascertain the effects of the ocean dumping. Time has become crucial, even if the bill were passed today, it will be six months before the bill becomes effective and then another two years before scientific studies can be completed. There is no reason for the enactment of this legislation to be postponed any longer. (Brackins-Florida) W73-02255 bill as passed, the Environmental Protection AgenCONFERENCE REPORT ON S.2770, AMEND-ING FEDERAL WATER POLLUTION CON-TROL ACT.

Congressional Record, Vol 118, p H8859-H8903 (daily ed.) Sept. 28, 1972.

Descriptors: *Federal Water Pollution Control Act, *United States, *Legislation, *Pollution abatement, *Government finance, Legal aspects, abatement, "Government finance, Legal aspects, Water quality standards, Water law watercourses (Legal aspects), Water pollution, Water pollution control, Research and development, Permits, Grants, Law enforcement, Effluents, Waste disposal, Waste treatment, Sewage effluents, Thermal pollution, Oil pollution, Sewage treatment

Identifiers: *Federal Water Pollution Control Act Amendments of 1972.

The Federal Water Pollution Control Act Amend The Federal Water Politition Control Act Amendments of 1972 (S.2770) was passed by both the House and the Senate in September 1972 following passage by the Joint Conference Committee. Title I of the bill deals with research and related pro-I of the bill deals with research and related pro-jects. This title contains a declaration of goals and policy which states it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985. Title II encompasses grants for the construction of waste treatment facilities. Water quality standards and enforcement of the standards are covered in Title III. Provisions for effluent limitations, implementation plans for water quality standards, liability for the discharge of oil and hazardus, substances and themselves. water quality standards, liability for the discharge of oil and hazardous substances and thermal discharges are included in this title. Title IV establishes a new waste discharge permit program, replacing the Refuse Act Permit Program. The new permit program provides an option to the states to preempt the federal program by establishing their own permit program subject to approval by the Environmental Protection Agency. Title V contains general provisions relating to administration of the Act, general definitions, citizen suits, judicial review and numerous other matters. Also included is an explanatory statement by the Contable of the Act. cluded is an explanatory statement by the Conference Committee. (Brackins-Florida) W73-02256

PUBLIC WORKS ON RIVERS AND HARBORS

Congression... Totard, Vol 118, p S16142-S16162 (daily ed.) Sept. 27, 1972.

Descriptors: *Legislation, *Federal budget, *Government finance, *Beach erosion, *Water resources development, Financing, Flood control, Navigation, Erosion control, Water supply development, Recreation, Flood protection, Channel improvement, Shore protection, Water supply, Federal project policy, Federal government, Project planning, Harbors, Budgeting, Government supports, Seashores. Descriptors: *Legislation, *Federal budget,

Identifiers: *Rivers and Harbors Flood Control Act of 1972. Shoreline Erosion Control Demonstration Act of 1972.

4018, the Rivers and Harbors Flood Control Act of 1972, as passed by the Senate, authorizes projects for flood control, navigation improvement. water supply, shore erosion and recreation. The total cost of all the projects authorized is \$546,022,300. Also contained in the bill is an in-3040,024,300. Also contained in the full is an in-crease from one million dollars to two million dol-lars in the size of small flood control projects that the Corps of Engineers can undertake without specific Congressional approval. Some Senators expressed concern that the bill fails to criticize the project evaluation standards as promulgated by the Water Resources Council. The bill also incor-porates the Shoreline Erosion Control Demonstration Act of 1972, designed to furnish federal aid for the critical problem of shore erosion. The bill lists individual project sites, the amount of federal money authorized and a brief description of the project. A number of amendments to the bill as reproject. A number of amendments to the bill as re-ported out of committee are also noted. Included is the full text of the final bill as it emerged from the Senate. Title I deals with Rivers and Harbors pro-jects and Shoreline Erosion, and Title II is con-cerned with Flood Control Projects. (Brackins-Florida) W73-02257

RODMAN DRAWDOWN SAVES TREES, House, Washington, D.C. C. W. B. Young. Congressional Record, Vol 118, p E8145-E8146 (daily ed.) Sept. 27, 1972.

Descriptors: "Florida, "Water level fluctuations, "Drawdown, "Impounded waters, Fishkill, Fish populations, Fishing, Fish conservation, Impoundments, Trees, Nutrients, River flow, River regulation, Water quality control, Water levels, Water management (Applied), Water control, Environmental effects.

The lowering of the water level in Rodman Pool along the Oklawaha River in Florida has triggered accusations of serious damages to fish and trees. accusations of serious damages to fish and Irees. However, the drawdown is reversing destruction of the area and resulting in the saving of thousands of trees without serious damage to fish. The Rodman Pool level was raised by the impoundment of water by the Rodman Dam, which is a part of the now defunct Cross-Florida Barge Canal. Critics of the drawdown averred massive fishkills would result from lowering the level of the pool. But a tour of the area by officials of the Forest Service, the Florida Game and Fresh Water Fish Commission and newsmen revealed that trees that had sion and newsmen revealed that trees that had been threatened by the flooding of Rodman had begun to sprout new leaves and cypress knees had begun to start new shoots. Furthermore, fishing begun to start new shoots. Furthermore, fishing did not appear to be impaired by the drawdown. It is believed that 25,000 trees on 1,000 acres will be saved by the drawdown. The trees along the Oklawaha and Rodman eat the nutrients in the water. The demise of these trees would have created nutrient problems in the Rodman Pool. (Brackins-Florida)

CLEAN RHETORIC AND DIRTY WATER, A. M. Freeman, III, and R. H. Haveman Public Interest, p 51-65, Summer 1972.

Descriptors: "Water pollution control, "Administrative agencies, "Water pollution treatment, "Water quality control, Water quality, Water Quality Act, Water pollution, Legistat", Administrative decisions, Pollution abatement, Law enforcement, Legal aspects, Water law, Municipal wastes, Treatment, Watercourses (Legal aspects), Federal Water Pollution Control Act, Treatment Government finance. Government, Discharge (Water), Effluents.
Identifiers: *Council on Environmental Quality.

The last two decades of legislation designed for water pollution control is evaluated. Present federal water pollution control policy is based on regulatory strategy stressing two main elements: (1) a program of federal subsidies to cities for the (1) a program of federal subsidies to cities for the construction of waste treatment plants; and (2) a procedure for establishing regulations to limit discharges and for enforcing these rules through the police power of the state and, ultimately, the courts. Under present laws, federal money being spent and the tax subsidies created are allowing polluters to generate and dispose of large quantities of wastes without bearing the full cost of their discharges—and then using taxnayers' money to discharges-and then using taxpayers' money to clean up after them. The result is that the Nation's crean up after them. The result is that the Nation's rivers are in worse shape than ever before. The trend of present legislation is to include more of the same discretionary policies which have produced selective non-enforcement and low-visibility decision making. As an alternative, an effluent-ci and neg produce generate

PROCE AND RE Water R For prin W73-022

MANAG AREAS, Flood Pl For prim

REGION

GLAND

Boston I For prim W73-023 AUTHO DEVEL Cornell 1 D. J. Alle Available

tion Ser \$0.95 in

Report N

Descript Water pe

water re grams a governm views w local go terested is placed than offi volved i what is g The con capacity ment ca number lated and National for reorg and for ithe Fede W73-023

COURTS JUDICIA Environa G. P. Tho Available tion Serv \$0.95 in Report N 006.

Descripte ing, *Wa *Planning Standard procedur Identifie fluent-charge policy which would end bargaining and negotiating between agencies and individual producers is proposed. This policy would actually generate revenues under a system similar to re-porting and paying income taxes. (Tolle-Florida) W73-02260

PROCEDURES FOR EVALUATION OF WATER RND RELATED LAND RESOURCE PROJECTS. Water Resources Council, Washington, D.C. For primary bibliographic entry see Field 06G. W73-02271

MANAGEMENT PROBLEMS IN FLOOD PLAIN

AREAS,
Wisconsin Dept. of Natural Resources, Madison. Flood Plain and Shoreland Management Section. For primary bibliographic entry see Field 06F. W73-0228

REGIONAL GOVERNMENT IN NEW EN-GLAND: A PROTOTYPE, Boston Univ., Mass. School of Law. For primary bibliographic entry see Field 06G. W73-02304

AUTHORIZATION AND APPROPRIATION PROCESSES FOR WATER RESOURCE DEVELOPMENT, Cornell Univ., Ithaca, N.Y.
D. J. Allee, and H. M. Ingram.
Available from the National Technical Information Service as PB-212 140, \$6.75 in paper copy, \$0.95 in microfiche. National Water Commission Report NWC-SBS-72-060, (1972), 272 p. NWC 72-023.

Descriptors: *Water resources, Natural resources, Water policy, Water resources development, *Administration, Decision making, Federal government, *Appropriation, *Planning, *Budgeting.

The complex procedural steps involved in getting The complex procedural steps involved in getting water resources development projects and programs authorized and financed by the Federal government are examined on the basis of interviews with 160 people from Federal, state and local governments and from organizations interested in water resource development. Emphasis is placed more on what actually takes place, rather than official statements of procedures. Who is involved in the procedures, how they operate, and what is gained by their involvement are discussed. The conclusion is reached that decision making The conclusion is reached that decision making capacity is a more limiting resource than investment capital in water resource development. A number of possible recommendations are postu-lated and discussed from the consideration of the National Water Commission, including proposals for reorganization of the Committee structure and modus operandi of Congressional Committees, and for reorganization of the executive branch of the Federal Government. (NWC) W73-02364

COURTS AND WATER, THE ROLE OF THE JUDICIAL PROCESS, Environmental Law Inst., Washington, D.C.

G. P. Thompson.

Available from the National Technical Informa-AVAILIDE TOM THE NATIONAL Technical Informa-tion Service as PB-211 974, \$6.00 in paper copy, \$9.95 in microfiche. National Water Commission Report NWC-L-72-055, July 1972, 181 p. NWC 72-006.

Descriptors: *Judicial decisions, *Decision making, *Water quality, *Water allocation (Policy), *Planning, Institutions, Administrative agencies, Standards, Water pollution, Adjudication procedure. Identifiers: *Courts, *Litigation, *Administrative The strengths and weaknesses of courts as institu-The strengths and weaknesses of courts as institu-tions for resolving water conflicts are examined. Courts produce decisions, operate relatively quickly and impartially, are accessible and are competent to deal with 'technical' questions through isolating critical facts and the policy mat-ters which underlie such questions. The role of courts in water quality is discussed under common law concepts, nuisance suits, acts authorizing adlaw concepts, auisance suits, acts authorizing ad-ministrative action and acts such as the Michigan Environmental Protection Act of 1970 which per-mit an expanded judicial role in the setting, testing and enforcement of standards. The courts' role in water allocation, in reviewing whether water planning meets legal standards, particularly under NEPA, and in settlement negotiations is discussed. Conclusions are: Administrative agen-cies should take primary convernmental responsicuscussed. Conclusions are: Administrative agen-cies should take primary governmental responsi-bility for implementing water quality statutes, sub-ject to judicial review. The purpose of Michigan-type statutes to make the administrative process type statutes to make the administrative process more responsive is salutary. Water allocation ordinarily should be handled by administrative agencies. The courts' role in reviewing water planning under NEPA has been appropriate. (NWC)

WATER POLLUTION CONTROL IN THE UNITED STATES.
National Water Commission, Arlington, Va. For primary bibliographic entry see Field 05G.
W73-02366

WATER RESOURCE PLANNING. National Water Commission, Arlington, Va. For primary bibliographic entry see Field 06B. W73-02368

LEGAL PROTECTION OF THE PACIFIC LEGAL PROTECTION OF THE PACIFIC NORTHWEST ESTUARIES, Environmental Protection Agency, Portland, Oreg. Water Quality Office. For primary bibliographic entry see Field 05C. W73-02459

EFFECTS OF INSTITUTIONAL CONSTRAINTS AND RESOURCES PLANNING ON GROWTH IN AND NEAR ESTUARIES, Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
For primary bibliographic entry see Field 05C.
W73-02465

RECENT FEDERAL POLICIES AFFECTING MARINE SCIENCE AND ENGINEERING DEVELOPMENT, National Council on Marine Resources and Engineering Development, Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-02466

MAINTENANCE OF WATER QUALITY—ALBERTA'S LEGISLATIVE SCHEME AND THE COMMON LAW, For primary bibliographic entry see Field 05G. W73-02525

THE NEED TO CONTROL OCEAN DUMPING, Senate, Washington, D.C. J. C. Boggs, and W. V. Roth. Congressional Record, Vol 118, p S16581-S16587 (daily ed.) October 3, 1972.

Descriptors: *Legislation, *Waste dumps, *Waste Descriptors: "Legislation, "waste dumps, "Waste disposal, "Oceans, Water law, Water pollution control, Ocean circulation, Legal aspects, Water pollution sources, United States, Pollution abatement, State governments, Delaware, Federal government, Municipal wastes, Industrial wastes, Spoil banks, Beaches, Sewage disposal, Shellfish, Marine fisheries, Sludge disposal, Pollutant identification.

Identifiers: *Coastal waters, Ocean dumping.

On July 27, 1972, House and Senate conferees announced that agreement had been reached on H.R.9727, the Marine Protection and Research Act H.K.9727, the Maine Protection and Research Act of 1972 (Ocean Dumping Bill). The report of the conferees has yet to come for a vote in Congress. Meanwhile the cities of Philadelphia and Camden continue to dump approximately 121 million gal-lons of sewage sludge each year off the coast of Delaware. Conditions have become so bad that the Delaware. Conditions have become so bad that the sale of commercial shellfish from that area. The Ocean Dumping Bill was based on a report on ocean dumping prepared by the Council on Environmental Quality in 1970. Highlights of that report are included in these remarks. Also included are conclusions and recommendations of the President's Water Pollution Control Advisory Board on Ocean Director In Report presents that the process of the Report presents of on Ocean Disposal. The Board recognized that un-restricted ocean dumping posed serious pollution problems to the marine environment and resources and that more scientific and technical data on the environmental effects were needed. Indis-criminate dumping into the oceans, however vast they may appear to be, can have immense economic and environmental costs. We are only beginning to learn the dimension of those costs. (Brackins-Florida)

ANALYSIS OF ACTIONS OF THE UNITED NA-TIONS SEABEDS COMMITTEE, House, Washington, D.C.

T. N. Downing.
Congressional Record, Vol 118, p H9811-H9813 (daily ed.) October 12, 1972.

Descriptors: *Legislation, *Mining, *Water resources development, *Law of the sea, United Nations, Legal aspects, International commissions, Oceans, Water law, Exploitation, United States, Beds under water, Natural resources, International waters, Foreign countries, Commercial Identifiers: Coastal waters, Contiguous zone.

The confidence of ocean users is waning in the ability of the United Nations Seabeds Committee to achieve timely solutions to the broad range of problems it has undertaken to negotiate. Compar-ing the U.N. General Assembly Mandate to actions taken by the Seabeds Committee reveals only one task has been completed and one task partially completed. Thirteen tasks have been avoided. Perhaps it is time that states with ocean use capability begin to look for other bilateral and multilateral means to solve important ocean issues. For this reason the Deep Seabed Hard Mineral Resources Act will be reintroduced in the next session of Congress. This bill, formerly H.R. 13904, seeks to promote the orderly development of hard mineral resources of the deep seabed prior to U.S. ratification of a new Law of the Sea convention concerning these resources. Hearings were held on the bill although no action was taken in the last session of the House. (Brackins-Florida)

OIL POLLUTION ACT AMENDMENTS OF 1972 (H.R. 15627), House, Washington, D.C. E. A. Garmatz.

Congressional Record, Vol 118, p H9535-H9538 (daily ed.) October 11, 1972.

Descriptors: "Oil pollution, "Legislation, "International commissions, "United States, Water pollution, Water pollution sources, Water pollution control, Water law, Legal aspects, Oil industry, Oil wastes, Oil spills, Law enforcement, Penalties (Legal), Ships, Navigation, International law, International waters, Oceans, Treaties. Identifiers: "Oil Pollution Act, Coastal waters, Continency one Contiguous zone.

Field 06-WATER RESOURCES PLANNING

Group 6E-Water Law and Institutions

The International Convention for the Prevention of the Pollution of the Sea by Oil governs the conduct of tankers and other ships as to the manner in which persistent oils are handled aboard ship in order to strictly limit the amount of oil content discharged into the seas. The Oil Pollution Act of 1961 is the domestic legislation that implements the provisions of that convention. The House has passed H.R. 15627 amending the Oil Pollution Act to incorporate recent amendments to the Convention. The Act amends the prohibited discharges of oil; construction requirements of ships and certification; penalties for violations, with criminal sanctions for willful violations and civil sanctions for negligent violations; and enforcement provisions. Furthermore, section twelve of the Oil Pollution Act is repealed. Following the text of the amendments are Congressional remarks. Reference is made to the fact that the United States Senate has ratified these amendments by ratifying the Convention. Also noted are measures. states seame has familed these amendments by ratifying the Convention. Also noted are measures taken by the oil industry to regulate itself. (Brackins-Florida) W73-02528

THE MEXICAN WATER TREATY AND ITS RELATIONSHIP TO COLORADO RIVER WATER SUPPLIES, House, Washington, D.C. For primary bibliographic entry see Field 05G.

W73-02529

CONFERENCE REPORT ON THE FEDERAL WATER POLLUTION CONTROL ACT AMEND-MENTS OF 1972,

House, Washington, D.C. For primary bibliographic entry see Field 05G. W73-02530

PIGORSH V. FAHNER (EXCLUSIVE USE OF PRIVATELY OWNED LAKE).

194 N.W.2d 343-353 (Mich. 1972).

Descriptors: "Riparian rights, "Navigable waters,
"Public access, "Eminent domain, Judicial decisions, Riparian land, Public lands, Public rights,
Public benefits, Ownership of beds, Beds, Beds
under water, Navigation, Boating, Common law,
Constitutional law, Trespass, Easements, Legal
aspects, Boundary disputes, Legislation.

Plaintiffs, riparian owners, sought to enjoin all other persons from using a lake. The lake was completely surrounded by privately owned property, had no navigable inlet or navigable outlet, and was seventy-four acres in size. Plaintiffs contended the Michigan 'rule of property' compelled the court to follow stare decisis and grant the injunction. The Attorney General averred on behalf the court to follow stare decisis and grant the injunction. The Attorney General averred on behalf of the public that the lake is navigable in fact and therefore the 'inland lakes and streams act' requires that the lake be held open to public use. The Michigan Supreme Court held that one who is the owner in fee of all the upland surrounding a wholly private inland lake with no navigable inlet or outlet owns the subaqueous land of the lake and the water over it. His property right is such that he may exclude all others from the lake, the general public included. The court ruled that plaintiffs were entitled to exclude all other persons from using the lake regardless of whether the lake was navigable in fact. (Brackins-Florida)

MATHER V. STATE (OWNERSHIP OF ACCRE-TION TO ISLANDS IN A NAVIGABLE STREAM). 20 N.W.2d 498-503 (Iowa 1972).

Descriptors: *Iowa, *Judicial decisions, *Accretion (Legal aspects), *Boundaries (Property),

Watercourses (Legal aspects), Rivers, Dikes, Channels, Deposition (Sediments), Islands, Navigable waters, Riparian rights, Riparian land, Banks, High water mark, Navigable rivers, Legal

aspects.

Plaintiffs, riparian landowners, brought suit to quiet title to lands formed by accretion along a navigable river. Plaintiffs owned land on the Missouri River. In 1959 the Corps of Engineers built a series of pile dikes in the river in an attempt to stabilize the channel at a pre-determined depth. After that time land slowly built up around the dikes forming islands. The deposits started at the center of the dike and worked both inward and outward from that point. The state contended land had accreted to the islands, which were state lands, and plaintiff contended the accretion was to their riparian land. The Supreme Court of Iowa affirmed the lower court's decree and held that the accretion had been to the islands, which, because they were in a navigable stream, became property of the State. (Nielsen-Florida)

DOW CHEMICAL CO. V. DIXIE CARRIERS, INC. (PRIVATE CANAL SUBJECT TO REGULATION UNDER RIVERS AND HARBORS ACT). 463 F.2d 120-123 (5th Cir. 1972).

Descriptors: *United States, *Judicial decisions, *Navigable waters, *Federal jurisdiction, Water law, Legal aspects, Watercourses (Legal aspects), Rivers and Harbors Act, Canals, Navigation, Negligence, Ships, Damages, Transportations.

Plaintiff, owner of fender works, brought an ac-tion in admiralty against defendant time charterer for damages to the fender works resulting from for damages to the fender works resutting from three separate collisions between barges under tow. Plaintiff contended that its private barge canal, where the collisions occurred, was not a navigable water of the United States and thus was not subject to regulation under the Rivers and Har-bors Act. The United States Circuit Court of Apbors Act. The United States Circuit Court of Appeals for the Fifth Circuit affirmed the decision of the trial court and held, inter alia, that characterization of the canal as public or private is irrelevant in determining awigability. The court ruled that plaintiffs use of the canal for the purpose of transporting products and materials to and from its plants on a daily basis provides more than an ample basis for the conclusion that the canal was instrumentality of interestate compares subject an instrumentality of interstate commerce subject to regulation under the Rivers and Harbors Act. (Brackins-Florida) W73-02533

LAWS FOR A BETTER ENVIRONMENT. Oregon State Unov., Corvallis. Water Resources Research Inst.

Seminar conducted by Oregon State University Water Resources Research Institute Fall Quarter 1971. Report SEMN WR 015.72, January 1972, 97 p. OWRR A-999-ORE (12).

Descriptors: *Water law, *Legislation, *Institutions, Navigation, Estuaries, *Oregon.

Improvement and protection of the quality of the environment have become national policy. This has resulted in executive, legislative, and judicial has resulted in executive, legislative, and judicial activity at all levels of government on an increasing scale. The growth of this area of jurisprudence makes it difficult to keep abreast of the latest developments—not only for the concerned citizen but for members of the legal profession as well. To call attention to some of the basic considerations was the purpose of this seminar series. The discussions was the purpose of this seminar series. sions were attended by faculty, students, representatives of federal and state agencies, and the general public. Topics were New Federalism and Populism, Water Law Doctrine, Role of the Federal Government in Natural Resource Law, Navigability of Lakes and Streams in Oregon, Legal tools in Achieving Environmental Quality Control, Environmental Law, Estuary Manage-ment, Public Trust Doctrine and the Environmen-tal Protection Agency. (Buckley-Oregon)

OBJECTIVES OF WATER RESOURCE MANAGEMENT - CAN THEY BE ACHIEVED THROUGH LEGISLATION, Oregon State Univ., Corvallis. School of Business and Technology.

J. Park, and J. G. Monks.

Paper presented at National Symposium, American Water Resources Association, Fort Collins, Colorado, June 19, 1972. 20 p. OWRR B-016-ORE

Descriptors: "Water management, "Institutions, "Legislation, Social needs, Economics, "Water policy, Competing uses, Multi-purpose projects, Oregon.

Identifiers: "Junction City (Oregon).

A detailed case study of a multi-purpose water control project suggests that current legislation is inadequate to accomplish many of the water management objectives deemed important by individuals in society. Conflicts arise with respect to (a) private vs. public water users, (b) agricultural vs. recreational users, (c) current vs. future users, vs. Icetational users, (c) direct vs. Interest vs. Interest vs. feet. Society lacks a clearly defined, agreed upon set of priorities for utilization of water resources. This deficiency stems from fundamental problems of defining what constitutes an 'equitable' use of a resource. Societal group objectives do not lend themselves to weighting schemes that would validify legal standards of 'fairness and justice.' In the absence of specific criteria for 'equity,' it is difficult to substantiate a broad claim that equity is, in fact, the prevailing state of nature. The Ju tion City Water Control District case study has confirmed that individuals who are economically affected by a water control project are largely uninformed (or apathetic) with respect to project objectives. W73-02561

6F. Nonstructural Alternatives

LOCAL PROTECTION AND FLOODPROOFING PROJECT, MATEWAN, WEST VIRGINIA, TUG FORK OF BIG SANDY RIVER (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. W73-01991

SOIL ASSOCIATIONS AND LAND CLASSIFI-CATION FOR IRRIGATION, SOCORRO COUN-

TY, New Mexico State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 03F.
W73-02117

MANAGEMENT PROBLEMS IN FLOOD PLAIN

AREAS,
Wisconsin Dept. of Natural Resources, Madison.
Flood Plain and Shoreland Management Section.

Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 98, No WW3, p 357-373, August, 1972. 7 ref, append.

Descriptors: *Flood plains, *Management, Local governments, *Water policy, State governments, Federal government, Cost sharing, Education.

Implement produced adequate to-date scale as assistance grams, n ing and magnitud magnitus and (6) a managen problem: grams wi local-star should n properly use police cies are environn priority f all levels these pr Wiscons W73-022

> ALTERN Southern D. G. An Available tion Serv \$0.95 in Report N NWC 71-Descript

ricanes, plain zo tural plar

Possible cies and Federal up to the 1966 rep trol police policy. R in Massa tern som programs Federal solutions metropol hurrican responsil human storms against si W73-023

6G. E Wat

SURFAC (SPRING Springfie J. W. Bra Available tion Serv \$0.95 in Water Report, Jun

> Descripto lution o gy, Wetl Mapping supply, E

Implementation of any type of flood plain management program will encounter several problems. Among these are (1) a statewide lack of flood data adequate for regulatory purposes; (2) a lack of upod-date topographic base mapping of sufficient scale and accuracy; (3) a lack of technical assistance; (4) conflicting state and federal programs, regulations, and policies; (5) a lack of funding and administrative staffing to cope with the magnitude of administrative and technical needs; and (6) a lack of continuing support for flood plain management programs. Due to these and other problems, successful flood plain management programs will require a uniform and coordinated joint local-state-federal effort. Flood plain management abould not be considered in terms of a single purpose objective, flood damage prevention, but properly related to an overall national or state land use policy. Major revisions in land taxation policies are needed to achieve flood plain and related environmentalmanagement objectives, and restrictive floodway areas should be given high priority for open space acquisition. Also, a strong and continuous educational program on behalf of all levels of government is needed if the effects of these problems are to be mitigated. (Settle-Wisconsin)

ALTERNATIVE ADJUSTMENTS TO NATURAL HAZARDS, Southern Illinois Univ., Carbondale.

Southern lininois Univ., Caroondaie.
D. G. Arey and D. D. Bauman.
Available from the National Technical Information Service as PB-211 922, \$5.45 in paper copy,
\$0.95 in microfiche. National Water Commission
Report NWC-SBS-72-058, December 1971, 119 p.
NWC 71-019.

Descriptors: "Water policy, Flood control, "Hurricanes, "Droughts, "Zoning, Land use, Flood plain zoning, "Alternative planning, Non-structural planning.

Possible changes in Federal water resources policies and programs are suggested for reduction of
losses from floods, drought, and hurricanes.
Federal flood control policy is reviewed, leading
up to the analysis of alternatives contained in the
1966 report of a task force on Federal flood control policy which is leading to changes in Federal
policy. Response to the drought of the mid-1960's
in Massachusetts is analyzed, showing that a pattern somewhat similar to the evolution of Federal
programs for flood control is evolving, with
Federal assumption of responsibility for finding
solutions to water supply problems in the great
metropolitan centers. Increasing damages from
hurricanes has also led to increasing Federal
responsibilities. The need for better research into
human response to warnings of danger from
storms is suggested. Arguments are presented
against single solutions, and emphasis is placed on
the need for research on alternatives. (NWC)

6G. Ecologic Impact of Water Development

SURFACE WATERS OF A SMALL CITY (SPRINGFIELD, MASS), Springfield Coll., Mass. J. W. Brainerd.

J. W. Brainerd.

Available from the National Technical Information Service as PB-213 174, \$3.00 in paper copy, \$0.95 in microfiche. Massachusetts University Water Resources Research Center Completion Report, June 30, 1972. 8 p. OWRR A-027-MASS (1).

Descriptors: *Environmental control, *Water pollution control, *Colleges, *Projects, *Massachusetts, Ecology, Investigations, Methodology, Wetlands, Surface waters, Streams, Lakes, Mapping, Ice, Swamps, Microorganisms, Water supply, Education.

Identifiers: *Springfield (Mass), Student participation, Faculty participation.

Students and faculty at Springfield College, Masachusetts, investigated ways urban colleges can study surface waters so they can become better leaders in conservation, helping crowded communities appreciate and adapt more positively to their natural resources, especially water. Art, biology, community education, environmental studies, natural resources, physical sciences, and psychology were involved, and interdisciplinary efforts were made. Nine college faculty members became involved. Twelve college students had individual projects funded; six additional students helped as volunteers. Twelve local school teachers at elementary and junior high level cooperated, and their pupils became involved directly with water in their environment. Four public and parochial school administrators were contacted. Sprngfield College administrators accepted a new program of an interdisciplinary sort—environmental studies. Municipal servants in five departments helped college faculty and students learn about local water problems. College students (all undergraduates but one) experimented in finding ways to use local wetlands and water bodies as stimulating environments to complement indoor educational facilities. In all disciplines, fourteen projects were completed. (Woodard-USGS) ents and faculty at Springfield College, Mas-

CONSTRUCTION OF WASTEWATER FACILI-TIES, AUSTIN, TEXAS (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Environmental Protection Agency, Dallas, Tex. Region VI.

For primary bibliographic entry see Field 05D. W73-01980

MILITARY OCEAN TERMINAL, SI POINT, NORTH CAROLINA (DRAFT VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Wilmington, N.C. For primary bibliographic entry see Field 04A. W73-01981

PORT HUENEME HARBOR, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 08A. W73-01984

EAGLE-TUMBLEWEED DRAW WATERSHED, NEW MEXICO (DRAFT ENVIRONMENTAL IM-PACT STATEMENT). Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D. W73-01985

ALUM CREEK LAKE, ALUM CREEK, SCIOTO ALUM CREEK LARE, ALUM CREEK, SCIOTO RIVER BASIN, OHIO (DRAFT ENVIRONMEN-TAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. W73-01986

LYTLE AND WARM CREEKS, SAN BERNAR-DINO COUNTY, CALIFORNIA (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 08A. W73-01987

RIRIE DAM AND LAKE, WILLOW CREEK, IDAHO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Walla Walla, Wash. For primary bibliographic entry see Field 08D. W73-01988

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Portland, Oreg. For primary bibliographic entry see Field 08D. W73-01989

WHITEOAK DAM AND RESERVOIR, WHITEOAK DAM AND RESERVOIR, WHITEOAK CREEK BASIN, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. W72.01960. W73-01990

LOCAL PROTECTION AND FLOODPROOFING PROJECT, MATEWAN, WEST VIRGINIA, TUG FORK OF BIG SANDY RIVER (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va. For primary bibliographic entry see Field 08A. W73-01991

TEHAMA-COLUSA, CENTRAL VALLEY PRO-JECT, CALIFORNIA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 08A. W73-01994

HEMPSTEAD HARBOR, NEW YORK NAVIGA-TION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, New York. For primary bibliographic entry see Field 08A. W73-01995

(SANTA ROSA, SONOMA COUNTY, CALIFORNIA, SEWER COLLECTION AND WATER DISTRIBUTION SYSTEM), (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Economic Development Administration, Washington, D.C. For primary bibliographic entry see Field 03D. W73-01996

TAYLORS BAYOU, TEXAS, DRAINAGE AND FLOOD CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Galveston, Tex. For primary bibliographic entry see Field 08A.

DREDGING AND FILLING, COWIKEEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (DRAFT STATEMENT). **ENVIRONMENTAL**

Army Engineer District, Mobile, Ala. For primary bibliographic entry see Field 04A. W73-02233

BUCKS HARBOR, MACHIASPORT, MAINE (FINAL ENVIRONMENTAL IMPACT STATE-MENT).

Army Corps of Engineers, Waltham, Mass. New
England Div. For primary bibliographic entry see Field 08A. W73-02234

BOXELDER CREEK WATERSHED PROJECT, COLORADO AND WYOMING (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D.

Field 06-WATER RESOURCES PLANNING

Group 6G-Ecologic Impact of Water Development

SIERRA CLUB V. FROEHLKE (JUDICIAL REVIEW OF ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 06E.
W73-02238

TO SAVE AMERICA'S DRIVE For primary bibliographic entry see Field 06E.

DEFENDING THE ENVIRONMENT-A CASE HISTORY, For primary bibliographic entry see Field 06E. W73-02250

ENVIRONMENTAL. MANAGEMENT PUGET SOUND: CERTAIN PROBLEMS OF POLITICAL ORGANIZATION AND ALTERNA-TIVE APPROACHES, Washington Univ., Seattle. Div. of Marine

Resources. For primary bibliographic entry see Field 06E. W73-02251

HIGHLAND LAKE FALL CREEK BASIN, INDI-ANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 08D. W73-02253

PEARL RIVER BASIN, EDINBURG DAM AND LAKE, MISSISSIPPI AND LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08D. W73-02254

UP AND DOWN WITH ECOLOGY--THE 'IS-SUE-ATTENTION CYCLE', A. Downs.

Public Interest, p 38-50, Summer 1972.

Descriptors: *Social impact, *Social participation, *Psychological aspects, *Attitudes, Human Descriptors: Social impact, Social participation, "Psychological aspects, "Attitudes, Human resources, Motivation, Environment, Social change, Social function, Resources, Social aspects, Social values, Water pollution control, Behavior.

The systematic 'issue-attention cycle' which seems to influence public attitudes and behavior concerning most key domestic issues is described. The cycle is rooted both in the nature of certain domestic problems and in the way major communications media interact with the public. The cycle's five stages, which may vary in duration depending upon the issue involved, are: the preproblem stage, alarmed discovery and euphoric enthusiasm of the public, realization by the public of the cost of significant progress, gradual decline of intense public interest, and the post problem stage. The characteristics generally possessed by the social problems which go through the cycle are also discussed. Public interest in the quality of the also discussed. Public interest in the quality of the environment now appears to be about midway through the cycle. It appears that the environmental issue will move into the 'post problem' stage of the cycle. However, certain characteristics of the environmental issue will protect it from the rapid decline in public interest typical of many other recent issues. Typical of these characteristics is that environmental pollution is much more visible and more clearly threatening than most other so-cial problems. (Ellis-Florida) W73-02259

HAMLIN BEACH STATE PARK COOPERA-TIVE BEACH EROSION CONTROL PROJECT,

LAKE ONTARIO, MONROE COUNTY, NEW YORK (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Buffalo, N.Y. For primary bibliographic entry see Field 08A. W73-02261

MAINTENANCE DREDGING, CHATHAM (STAGE) HARBOR, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Corps of Engineers, Waltham, Mass. New England Div. For primary bibliographic entry see Field 04A. W73-02262

SUNRISE SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATE-MENT). Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D.

W73-02263

SMALL BOAT HARBOR PROJECT, BETHEL, ALASKA (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Anchorage, Alaska. For primary bibliographic entry see Field 04A.

W73-02264

PUEBLO DAM AND RESERVOIR, FRYING-PAN-ARKANSAS PROJECT COLORADO (FINAL ENVIRONMENTAL IMPACT STATE-MENT).

Bureau of Reclamation, Washington, D.C. For primary bibliographic entry see Field 08D. W73-02265

SACRAMENTO RIVER BANK PROTECTION PROJECT, CALIFORNIA (DRAFT ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District, Sacramento, Calif. For primary bibliographic entry see Field 08D. W73-02266

LEADING CREEK CONSERVANCY DISTRICT (FINAL ENVIRONMENTAL IMPACT STATE-

MENT). Economic Development Administration, Chicago, Ill. Midwestern Region.
For primary bibliographic entry see Field 05F.

W73-02267

BIG CREEK AND METRO ZOO FLOOD AND AESTHETIC IMPROVEMENT, CLEVELAND, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.

For primary bibliographic entry see Field 04A. W73-02268

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (DRAFT ENVIRONMENTAL IM-PACT STATEMENT). Army Engineer District, Louisville, Ky.

For primary bibliographic entry see Field 08A.

RIVER ROUGE FLOOD CONTROL PROJECT. WAYNE COUNTY, MICHIGAN (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Detroit, Mich. For primary bibliographic entry see Field 04A. W73-02270

PROCEDURES FOR EVALUATION OF WATER AND RELATED LAND RESOURCE PROJECTS. Water Resources Council, Washington, D.C.

Available from the National Technical Informa-tion Service as PB-209 178, \$6.00 in paper copy, \$0.95 in microfiche. September 1971. 354 p, 1 fig, 3 map, 19 tac.

Descriptors: *U.S. Water Resources Council, *Planning, *River basin development, *Water resources development, *Administrative agencies, Rivers and Harbors Act, Water resources, Legislation, Budgeting, Economic efficiency, Economic justification, Estimated costs, Forecasting, Management, Regional development, Water policy, Cost-benefit analysis, Cost-benefit ratio, Federal government, Regulation

This study consists of the findings and recommendations of the Special Task Force appointed by the Water Resources Council to review evaluation practices currently being used by federal agencies in regional or river basin planning and in planning federal water and related land projects. The Task Force recommends a general policy statement entitled 'Principles for planning Water and Land Resources' to be implemented by 'Standards for Planning Water and Land Resources'. These two documents are included in the recommendations. Also included are the recommended principles and standards for planning water and land resources. The findings summarize the public response to the Task Force's report, field test results, federal agency reviews, technical reviews by experts, and the main provisions of the recommended planning principles and standards. The recommendations suggest stept for the Water Resources Council to follow in adoption of the principles and the standards. Under the Task Force proposal, several procedural documents will be issued by the Water Resources Council to facilitate planning activities. (Wheeler-Florida) W73-02271

WHAT PRICE WATER, For primary bibliographic entry see Field 06B. W73-02284

WASTEWATER TREATMENT WORKS PLANNING, ECONOMICS AND TECHNOLO-GY-SOME NEW DIRECTIONS, Environmental Protection Agency, Washington, D.C. Office of Water Programs.

For primary bibliographic entry see Field 05D.

W73-02296

POWER, POLLUTION, AND PUBLIC POLICY, ISSUES IN ELECTRIC POWER PRODUCTION, SHORELINE RECREATION, AND AIR AND WATER POLLUTION FACING NEW ENGLAND AND THE NATION.
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.

Available from the National Technical Informa-tion Service as COM-72-10398, \$9.00 in paper copy, \$0.95 in microfiche. M.I.T. Report No 24, Sea Grant Publication Report No MITSG. 71-8, June, 1971. 322 p. GH-88.

Descriptors: *Regional analysis, *Economic efficiency, *Pollution abatement, *Air pollution, *Water pollution, *Electric power production, Recreation demand, Recreation facilities, Environmental effects, Local governments, State governments, Land use, Decision making, *Planning, *Externalities.

Six studies which concentrate on environmental issues in New England are presented. First, a general framework for analyzing environmental

problems is occurs beca nefficient vironmenta lective act Second, the tion and its and constru power sites safe metho demand for diminishing for shoreling for shorelin Fourth, ap emissions Fifth, the Boston Har disposal is ble re gested. Six regional in proposals f into regiona thru W73-02 W73-02299

> THE FRAM Massachus Grant Proje D. W. Ducs In: Power, port No 2 MITSG. 71

Descriptors vironmenta tion, Loca Planning, (Identifiers:

An analytic

mental pro tioning eco about an ef consistent by a willing tions are resources (inability to ty resource appropriati ever such a action arise involve ec cisions c tal resource often made localized lective acti mine the pi dle a proble when the p Second, polective soluthe market Wisconsin) W73-02300

> OFFSHOR PLANTS, Massachus Grant Proje D. W. Duce In: Power, port No 2 MITSG. 71 ref, 1 apper

problems is developed. Environmental pollution occurs because of market failure and economically inefficient governmental decision making. En-vironmental destruction can be halted through colvironmental destruction can be hatted through collective action taken by regional authorities. Second, the critical area of electric power production and its associated difficulties in the areas of environmental degradation, land-use conflicts, and construction delays is investigated. Offshore and construction delays is investigated. Offshore power sites are proposed as an environmentally safe method of meeting New England's growing demand for power. Third, the crisis created by a diminishing supply of and an increasing demand for shoreline recreation facilities is examined. A for shoreline recreation facilities is examined. A new framework for long-term coastal zone management that places the primary responsibility for shoreline recreation on the states is proposed. Fourth, approaches to controlling sulfur oxide emissions into the atmosphere are discussed. Fifth, the serious water pollution problem in Boston Harbor is examined. Sludge handling and disposal is found to be a major pollution are suggested. Sixth, the need for regional control over regional resources is considered. Several proposals for transforming sub-regional authority into regional authority are made. (See W73-02300 thru W73-02304) (Settle-Wisconsin) W73-02304) W73_02200

THE FRAMEWORK FOR ANALYSIS, Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.

Grant Project Unite.
D. W. Ducsik.
In: Power, Pollution, and Public Policy, MIT Report No 24, Sea Grant Publication Report No MITSG. 71-8, p 5-28, June, 1971. 1 fig, 7 ref. GH-

Descriptors: *Prices, *Economic efficiency, *Environmental effects, Water pollution, Air pollution, Local governments, Regional analysis, Planning, Optimization, Public utilities, Recreation facilities.

Identifiers: *Markets, *Collective action.

An analytical framework for evaluating environmental problems is developed. In a properly functioning economy, the price mechanism will bring about an efficient allocation of goods and services consistent with the values of society, as expressed by a willingness to pay. However, if certain conditions are violated, markets fail to appropriate resources efficiently. For example, the market's inability to efficiently price such common property resources as air and water has resulted in a misappropriation of these basic natural assets. Whenappropriation of these basic natural assets. Whenever such a market imperfection leads to a serious ever such a market imperfection leads to a serious misallocation of resources, a need for collective action arises. Regrettably, collective action may involve economic inefficiencies also. Political decisions controlling the allocation of environmental resources that may affect an entire region are often made by local governments, who weigh only localized costs and benefits. This analytical framework suggests two broad guidelines for collective action. First, policy makers should determine the proper sphere of action in which to handle a problem. To do this, it is necessary to realize when the private market will or will not work well. Second, policy makers should be certain that collective solutions provide a better allocation than the market provided. (See also W73-02299) (Settle-

OFFSHORE SITING OF ELECTRIC POWER PLANTS, Massachusetts Inst. of Tech., Cambridge. Sea

Grant Project Office.
D. W. Ducsik, P. Mertens, and G. Neill.

In: Power, Pollution, and Public Policy, MIT Report No 24, Sea Grant Publication Report No MITSG. 71-8, p 29-89, June, 1971. 3 fig, 6 tab, 79 ref, 1 append. GH-88.

Descriptors: "Electric power production, "Electric power industry, "Electric power, "Barges, "Offshore platforms, Economic feasibility, Legal aspects, Pollution abatement, New England. Identifiers: "Offshore structures, "Technical

The technical, economic, and legal feasibility of siting electric power stations at offshore locations is investigated. Offshore siting offers several advantages. First, nearly all of the problems of land-use management associated with the siting of power-generating facilities can be avoided. For exnple, the problems of land cost and land availa bility become irrelevent. A second major advantage is the amenability of many offshore designs to shipyard construction. Diversion of American shipyards to the mass construction of power plants might constitute the most efficient use of this well-developed resource while having beneficial side effects on regional economies.

Furthermore, construction of offshore power plants at a shipyard has a potential for significant savings in construction time. The basic design choice for offshore stations is between floating platforms of enclosures and fixed structures that are solidly attached to the bottom. Fixed structures soundy attached to the bottom. Pixed structures can take the forms of man-made islands, fixed-pile platforms, jack-up platforms, and grounded barges. Designs for floating structures include submersible stations, ship hulls, and barges. A detailed study of the barge-mounted power station concept suggests that it is technically, economically, and legally feasible. (See also W73-02299) (Settle-Wisconsin) W73-02301

THE CRISIS IN SHORELINE RECREATION.

Massachusetts Inst. of Tech., Cambridge, Sea Grant Project Office.

Grant Project Office.

D. W. Ducsik, and R. Seitz.

In: Power, Pollution, and Public Policy, MIT Report No 24, Sea Grant Publication Report No MITSG. 71-8, p 90-186, June, 1971. 11 fig, 7 tab, 89

Descriptors: *Recreation demand, *Recreation facilities, *Shores, Recreation, Economic efficiency, Cost-benefit analysis, Local governments, State governments, Federal government. Identifiers: *Shorelines, *Market failure, Social cost, Social benefits, Externalities.

The problems of pollution and erosion have com-bined with the increasing tendency of private owners to restrict public access so that the supply of available shoreline is steadily diminishing. At the same time, the public's demand for shoreline the same time, the public semantial or solutions recreation is steadily increasing. These two trends have created serious problems of crowding and overuse of public shorelines. Underlying these problems is the failure of our present allocative mechanisms to efficiently allocate valuable shoreline resources. These failures arise because snoreme resources. These ranures arise because of (1) the price system's inability to accurately reflect social costs and benefits associated with shoreline use, and (2) the tendency of local governments to ignore cost spillovers. To help mitigate these problems, a new framework for least term costs! mitigate these problems, a new framework for long-term coastal zone management is proposed. Within this framework, states would assume primary responsibility for the planning and implementation of a comprehensive coastal land-use management plan. This master plan should establish goals and objectives consistent with the public interest. The federal government should (1) remaids a coastal suddictal framework with the public interest. provide an overall political framework within which the efforts of the states could be coordinated, and (2) establish objectives and guidelines to assist the states' decision making. The particular shoreline problems of Cape Cod and Boston are considered. (See also W73-02299) (Settle-W18consin) W73-02302

WATER QUALITY IMPROVEMENT IN BOSTON HARBOR,
Massachusetts Inst. of Tech., Cambridge. Sea Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office. D. W. Ducsik, and T. Najarian. In: Power, Pollution, and Public Policy, MIT Re-port No 24, Sea Grant Publication Report No MITSG. 71-8, p 242-281, June, 1971. 6 fig, 6 tab, 32

Descriptors: *Water quality, *Water pollution control, *Sludge, *Sludge disposal, Waste disposal, Pollution abatement, Recreation demand, Economic efficiency, *Massachusetts. Seafood, *Boston Harbor.

The serious water pollution problem in Boston Harbor prohibits the effective development of water-related recreational facilities on any large scale. The most important sources of pollution in the harbor are municipal sewage and sludge from the narror are municipal sewage and studge from the treatment plants, and raw sewage wastes, grease, oil, tar, sand, gravel, and other diverse solids that are mechanically separated from raw sewage and which decompose slowly on the ocean bottom and tend to accumulate through the years. The Boston Harbor is covered by a three-footthick layer of sludge. Unfortunately, sludge appears to have an extremely degrading and widespread effect on the bacterial quality of the water. Consequently, the current method of disposing sludge in Boston Harbor is one importasposing studge in Boston Flatfor is one impor-tant reason that the water is of unacceptable quali-ty, especially near the harbor islands located in the vicinity of the sludge outfalls. Alternative sludge treatment methods include (1) piping undried studge to a landfill area or farther out to sea, (2) barging undried sludge farther out to sea, or (3) drying and storing sludge. Preliminary cost estimates suggest that implementation of one of these alternatives may be economically desirable. (See also W73-02299) (Settle-Wisconsin) W73-02303

REGIONAL GOVERNMENT IN NEW EN-

GLAND: A PROTOTYPE, Boston Univ., Mass. School of Law. R. Field, Jr., S. Lynch, R. Morse, Jr., and R.

In: Power, Pollution, and Public Policy, MIT Report No. 24, Sea Grant Publication Report No MITSG. 71-8, p 282-316, June, 1971. 4 fig. 4 tab, 51 ref. GH-88.

Descriptors: "Regional analysis, "Local governments, "Regional economics," Economic efficiency, Environmental effects, Pollution abatement, Land use, Management, Taxes, Planning, New England. Identifiers: *Regional governments, Land use

Many problems of water and air pollution are either created or aggravated by the frequent ina-bility of the political system to mobilize effective efforts to combat them. This situation arises because decisions with regional implications are generally formulated by sub-regional authorities, leading to inefficiency and poor planning. To help mitigate these problems, three guidelines are suggested. First, government should be administered gested. First, government should be admissible to a plane high enough to accommodate coordinated lower level implementation of policies. Second, total family income should be recognized as the only criterion for effective and equitable taxation. Third, efficient land allocation should be fostered Third, efficient land allocation should be fostered by more conscious application of existing control mechanisms. Suggestions for implementing these troad guidelines include (1) eliminating the multiplicity of sub-regional governments, (2) creating regional governments to administer interstate problem solving, and (3) overhauling the existing property tax in order to emphasize such social as land-use management and novulation congoals as land-use management and population con-trol. These goals could be achieved in part through a 50-year phased program to establish a regional

Field 06-WATER RESOURCES PLANNING

Group 6G-Ecologic Impact of Water Development

government and through implementation of a new property tax which would allocate scarce land resources. (See also W73-02299) (Settle-Wiscon-W73-02304

ENVIRONMENTAL QUALITY. A CHALLENGE

ENVIRONMENTAL QUALITY. A CHALLENGE FOR ACHIEVEMENT, Datatronic Systems Corp., Panorama City, Calif. Computer Sciences and Environmental Technolo-gy Div. For primary bibliographic entry see Field 05G. W73-02485

PROCEEDINGS, FOURTEENTH CONFERENCE ON GREAT LAKES RESEARCH.
For primary bibliographic entry see Field 02H.
W73-02498

A WATER USE MAP OF THE GREAT LAKES BASIN.

Department of Energy, Mines and Resources, Burlington (Ontario). Canada Centre for Inland Waters.

For primary bibliographic entry see Field 02H. W73-02512

NEWINGTON GENERATING STATION UNIT NO. 1, NEWINGTON, NEW HAMPSHIRE (DRAFT ENVIRONMENTAL IMPACT STATE-MENT).

Corps of gland Div. of Engineers, Waltham, Mass. New En-

For primary bibliographic entry see Field 08C. W73-02514

NIANGUA HYDRO PROJECT (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Federal Power Commission, Washington, D.C. Bureau of Power. For primary bibliographic entry see Field 08C. W73-02515

SAINT CATHERINE SOUND, MARYLAND (MAINTENANCE DREDGING) (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Baltimore, Md. rimary bibliographic entry see Field 04A. W73-02516

MIAMI HARBOR, FLORIDA, NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATE-

MEN 1). Army Engineer District, Jacksonville, Fla. For primary bibliographic entry see Field 08A. W73-02517

PALLIMOKE HARBOR OUTER CROSSING (PATAPSCO RIVER BRIDGE) BALTIMORE, MARYLAND (FINAL ENVIRONMENTAL IM-PACT STATEMENT). Coast Guard, Washington, D.C. For primary bibliographic entry see Field 08A. W73-02518 BALTIMORE HARBOR OUTER CROSSING

UNIT PLAN FOR MANAGEMENT OF THE HIWASSEE UNIT, CHEROKEE NATIONAL FOREST, TENNESSEE (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Cherokee National Forest, Cleveland, Tenn. For primary bibliographic entry see Field 04D. W73-02519

TOWARD EFFECTIVE AND EQUITABLE POL-LUTION CONTROL REGULATION, American Management Association, New York. For primary bibliographic entry see Field 05G. W73-02520

NEWHALL, SAUGUS AND VICINITY, LOS ANGELES COUNTY, SANTA CLARA RIVER AND TRIBUTARIES, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Los Angeles, Calif. For primary bibliographic entry see Field 08A. W73-02521

NEWHALEM CREEK PROJECT, WASHING-TON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Federal Power Commission, Washington, D.C. Bureau of Power. For primary bibliographic entry see Field 08C. W73-02522

CURRY CREEK RESERVOIR, NOI OCONEE RIVER, GEORGIA (DRAFT VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Savannah, Ga. For primary bibliographic entry see Field 08A. W73_02523

CLINCHFIELD DAM AND RESERVOIR, BROAD RIVER BASIN, NORTH CAROLINA AND SOUTH CAROLINA (DRAFT ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District, Charleston, S.C. For primary bibliographic entry see Field 08D. W73-02524

LAWS FOR A BETTER ENVIRONMENT. Oregon State Unov., Corvallis. Water Resources Research Inst. For primary bibliographic entry see Field 06E. W73-02560

07. RESOURCES DATA

7A. Network Design

HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE, National Weather Service, Silver Spring, Md. A. F. Flanders, and J. W. Schiesl. IEEE Transactions, Geoscience Electronics, Vol GE-10, No 1, p 47-51, January 1972. 3 fig, 3 ref.

Descriptors: *Data collections, *Hydrologic data, *Satellites (Artificial), *Telemetry, Streamflow, Meteorological data, Weather data, Flood forecasting, Streamflow foreasting, Warning systems. Identifiers: Geostationary satellites

The river and flood forecast and warning service of the National Weather Service depends on meteorological data and a hydrologic reporting network of nearly 5000 river and rainfall stations. Reports are collected daily or on a criteria basis during periods of heavy rainfall or high flow in the rivers. Less than 15% of the hydrologic network is telemetered. In 1967-1969, an experiment in river and rainfall data collection via NASA's ATS-1 satellite was conducted. This system could form the basis for a national data collection system to serve the nation's water resources users. The The river and flood forecast and warning service the basis for a national data collection system to serve the nation's water resources users. The satellite system, with its continuous data collec-tion and relay function, holds promise for provid-ing a life-saving and economic space-age benefit. (Knapp-USGS) W73-02036

7B. Data Acquisition

DEVELOPMENT OF A TAPE TRANSPORT BACTERIAL DETECTION SYSTEM; FINAL

REPORT,
Aerojet Medical and Biological Systems, El
Monte, Calif. For primary bibliographic entry see Field 05A.

W73-02012

TECHNIQUES FOR SAMPLING BENTHIC OR-GANISMS.

Oregon State Univ., Corvallis. Dept. of Oceanog-

Oregon State Univ., Corvains. Dept. of Oceanography.
A. G. Carey, Jr.
A vailable from the National Technical Information Service as RLO-1750-58, \$3.00 in paper copy, \$0.95 in microfiche. Report No RLO-1750-58, \$198. 19 p., 7 fig., 1 tab., 17 ref. Grant Nos GB-531, GB-4629. Contract Nos AT (45-1) 1750, AT (55-1)

Descriptors: *Sampling, *Equipment, *Benthic fauna, *Methodology, Trawling, Core drilling, Cores, Dredging, On-site data collections, Water sampling, Data collections, Marine animals. Identifiers: Otter trawl, Smith-McIntyre grab, Infauna, Epifauna, Anchor-box dredge

A brief description is given of sampling gear and of field methods devised for obtaining quantitative benthic samples and environmental information. An anchor-box dredge, Smith-McIntyre grab with integrated water bottle and pinger, and a beam trawl with odometer wheels are described with the trawf with odometer wheels are described with the appropriate techniques for gear operation and shipboard sample processing. Shipboard procedures for otter trawling and coring with Bouma-Reineck and Fowler-Kulm corers are described. (Holoman-Battelle) W73-02019

ADVANCES IN ANALYTICAL CHEMISTRY AND INSTRUMENTATION. VOLUME 9 - SPEC-TROCHEMICAL METHODS OF ANALYSIS. For primary bibliographic entry see Field 05A. W73-02096

MEASUREMENT OF LOW TURBIDITIES, Florida Univ., Gainesville.
For primary bibliographic entry see Field 05A. W73-02147

MICROWAVE EMISSION CHARACTERISTICS OF OIL SLICKS, Aeroiet-General Corp., El Monte, Calif. Microwave Div.
For primary bibliographic entry see Field 05A.
W73-02162

A QUANTITATIVE EVALUATION OF DIS-SOLVED OXYGEN INSTRUMENTATION, National Oceanographic Instrumentation Center, Washington, D.C. For primary bibliographic entry see Field 05B. W73-02165

NEUTRON ACTIVATION ANALYSIS OF WATER-A REVIEW, International Nutronics, Inc., Los Altos, Calif. For primary bibliographic entry see Field 05A. W73-02166

LABORATORY METHODS FOR THE MEA-SUREMENT OF POLLUTANTS IN WATER AND WASTE EFFLUENTS, National Environmental Research Center, Cincin-

nati, Ohio. Analytical Quality Control Lab. For primary bibliographic entry see Field 05A. W73-02167

ON THE USE OF STABLE ISOTOPES TO TRACE THE ORIGINS OF ICE IN A FLOATING TRACE THE ORIGINS OF ICE IN A FLOATING ICE TONGUE,
Cold Regions Research and Engineering Lab.,
Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-02168

MULTIPL FROM TU Bell Telepi For primar W73-02181

AIRBORN Bendix A Mich. For primar W73-02182

EFFECTS CLOUDIN DETECTION National A Moffett Fi For primar W73-02183

PETROLE TORING I Bailey Me gland). For primar W73-02194 RIRI.IOGE

PLANNING Oklahoma N. R. Nunr Available 209 633; \$ Geological December

Descriptor *Abstracts Telemetry, Hydrology and use. Data proce This annot documents ble, both p

the entire types of se attempt w ferent vie vary. In ca stract is re most of t further sim existed, ar followed by W73-02305

AN AUTO Geological G. F. Smoo Daughtrey. Washington Va, Ameri 93, 1972. 7

Descriptors *Bathymet collections Navigation

An automa capable of quickly, at areal cover MULTIPLE SCATTERING OF LASER LIGHT FROM TURBID WATER, Bell Telephone Labs., Inc., Whippany, N.J. For primary bibliographic entry see Field 05B. W73-02181

WATER QUALITY MEASUREMENTS WITH AIRBORNE MULTISPECTRAL SCANNERS, Bendix Aerospace Systems Div., Ann Arbor, Mich. For primary bibliographic entry see Field 05A.

EFFECTS OF SKYLIGHT POLARIZATION, CLOUDINESS, AND VIEW ANGLE ON THE DETECTION OF OIL ON WATER, National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center. For primary bibliographic entry see Field 05A. W73-02183

PETROLEUM TANKER POLLUTION MONI-TORING UNIT, Bailey Meters and Controls Ltd., London (England). For primary bibliographic entry see Field 05A. W73-02194

BIBLIOGRAPHY OF REMOTE SENSING FOR PLANNING AND ADMINISTRATIVE STUDIES, Oklahoma Univ., Norman.
N. R. Nungally.

Okianoma Umv., Norman.
N. R. Nunnally.
Available from NTIS, Springfield, Va 22151-PB-209 633; \$4.85 paper copy; 95 cents microfiche.
Geological Survey Interagency Report USGS-234,
December 1971. 65 p, 162 ref.

Descriptors: *Bibliographies, *Remote sensing, *Abstracts, *Reviews, Aerial photography, Telemetry, Planning, Regional development, Hydrology, Urbanization, Land development, Land use, Natural resources, Land resources, Data processing, Methodology, Evaluation.

This annotated bibliography of 162 remote sensing documents is representative of the material available, both published and unpublished, and covers the entire spectrum of application in terms of methodology, techniques and procedures, and all types of sensing systems. It is selective in that an attempt was made to present the best articles covering the same applications, and to present different viewpoints. The annotations themselves vary. In cases where reports contained abstracts which accurately summarized the study, the abstract is reproduced in full or abridged form. In most of these cases comments are added for further simplification. In cases where no abstract existed, an annotation was prepared. A subject listing which covers most of the topics is provided followed by a listing of all pertinent articles using the letter-number designation. (Woodard-USGS) W73-02305

AN AUTOMATED SYSTEM FOR DETERMIN-ING ESTUARINE BATHYMETRY, Geological Survey, Washington, D.C. G. F. Smoot, V. R. Schneider, and K. R.

Daughtrey.
In: Proceedings of Coastal Mapping Symposium, Washington, DC, June 5-8, 1972: Falls Church, Va, American Society of Photogrammetry, p 83-93, 1972. 7 fig.

Descriptors: *Telemetry, *Monitoring, *Bathymetry, *Estuaries, *Instrumentation, Data collections, Hydrologic data, Surveys, Profiles, Navigation.

An automated bathymetric profiling system is capable of surveying estuarine bathymetry quickly, at low cost, and with a high degree of areal coverage. The bathymetric profiler provides

a practical means of collecting and processing the voluminous and detailed data needed for many estuarine water-quality investigations. The system includes a ranging device, a depth sounder, a digital tape recorder, a precision clock and a digital logic package to control the system operation. Components are compactly packaged so that they can be easily transported and the system can be operated from a small boat. It is capable of operating over a maximum range of 100 km, with a probable range accuracy of 1 meter. The standard shipboard record includes time, two ranges, and depth, and the shore-based, water-level stations provide the data necessary for the tide-correction adjustments. A computer contouring program utilizes the data to provide a contour map of the estuarine basin. (Knapp-USGS)

TIME STABILITY OF AQUEOUS APDC AND ITS MANGANESE AND NICKEL COMPLEXES IN MIBK, Geological Survey, Menlo Park, Calif.

Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02K.
W73-02320

RADIOISOTOPE INVESTIGATION TECHNIQUES IN ENGINEERING GEOLOGY AND HYDROGEOLOGY (RADIOIZOTOPNYYE METODY ISSLEDOVANIYA V INZHENERNOY GEOLOGII I GIDROGEOLOGII), All-Union Scientific Research Inst. of

All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR). For primary bibliographic entry see Field 08G.

W73-02328

A PORTABLE AIRLINE TO MEASURE WATER LEVEL, C. E. Franzoy, and C. D. Busch.

C. E. Franzoy, and C. D. Busch. Agricultural Engineering, Vol 47, No2, p 86-87, February, 1966. 3 fig.

Descriptors: Water levels, *Water level recorders, *Manometers, Oil-water interfaces, *Measurement, Irrigation wells, Specific gravity, Instrumentation. Identifiers: Cascading water, Pumping levels.

An instrument used to measure water level in boreholes which is not affected either by oil on the water surface or cascading water is described. The principle of fluid pressure changes is used to locate a water level datum. In field tests, the water level readings obtained with the portable airline were within 2 percent of the levels measured with the steel tape and electric drop line. (Campbell-NWWA)
W73-02382

PHOTOGRAPHIC EXAMINATION OF WELLS, Layne Texas Co., Inc., Houston, Tex. For primary bibliographic entry see Field 08G. W72.07409.

WATER QUALITY CHARACTERISTICS AND THEIR MEASUREMENT, Honeywell, Inc., Fort Washington, Pa. Industrial

Div. For primary bibliographic entry see Field 05A. W73-02427

AUTOMATIC SYSTEM FOR MONITORING

WATER QUALITY, Lehigh Univ., Bethlehem, Pa. Dept. of Biology. For primary bibliographic entry see Field 05A. W73-02432 A POLYPROPYLENE LIGHT TRAP FOR AQUATIC INVERTEBRATES, California State Dept. of Fish and Game, Sacramento.

Cantonna State Dept. of Pish and Game, Sacramento.

L. R. Espinosa, and W. E. Clark.

Calif. Fish Game. Vol 58, No 2, p 149-152, 1972.

Identifiers: "Aquatic invertebrates, "Poly propylene light trap, Waterfowl botulism.

During research on waterfowl botulism a trap was designed which proved very successful in collecting aquatic invertebrates. Construction features are illustrated.—Copyright 1972, Biological Abstracts, Inc.
W73-02458

MULTIVARIATE APPROACHES TO ALGAL STRATEGIES AND TACTICS IN THE SYSTEMS ANALYSIS OF PHYTOPLANKTON, Wisconsin Univ., Madison. Dept. of Botany. For primary bibliographic entry see Field 05C. W73-02469

PROPOSED EXPERIMENTAL PROGRAMS FOR TESTING REMOTE SENSOR APPLICA-TIONS IN THE METROPOLITAN WASHING-TON AREA, Metropolitan Washington Council of Govern-

ments, D.C. H. J. Mallon, and J. Y. Howard.

ri. J. Malion, and J. Y. Howard. Available from NTIS, Springfield, Va 22151 as PB-207-524 Price \$3.00 paper copy; 95 cents microfiche. Geological Survey Interagency Report USGS-221, February 1972. 16 p. 1 tab, 9 ref. USGS 14-08-0001-12708 NASA W-13318.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data collections, *Planning, *Aerial photography, Water resources, Water pollution sources, Sediments, Urbanization, Land use, Regional development, Transportation, Data processing, Topography, Vegetation, Mapping. Identifiers: *Earth resources technology satellite (ERTS).

The Earth Resources Technology Satellite (ERTS), Series A, is scheduled for launch in 1972. In order to take fullest advantage of the expected data return from that program, the design of experiments should be appropriately matched to the unique sensors to be flown and operated and their specifications. Described is a group of suggested experiments to be conducted with ERTS-A and high altitude aircraft imagery to be obtained during the 1972 period upon implementation of the ERTS Program. Methods of analysis and measurements of land use, urban change, transportation, and possible pollution using small scale, low resolution data are discussed. This report is part of a series of studies undertaken by the Metropolitan Washington Council of Governments' (MWCOG) Remote Sensing Project. The Project has been conducted under a contract with the Geographic Applications Program of the U.S. Geological Survey, the basic objectives of which have been to investigate and assess the utility and value of remote sensing data as an information source in support of the MW-COG's urban and regional planning programs. (Woodard-USGS)

DIVING TECHNIQUES USED IN THE STUDY OF FERROMANGANESE NODULE DEPOSITS, Michigan Univ., Ann Arbor. Dept. of Meteorology and Oceanography. For primary bibliographic entry see Field 02H. W73-02513

A SIMPLE DEVICE FOR THE SORTING OF LIVING PLANKTONIC COPEPODS, Geological Survey of Israel, Jerusalem. Marine Geology Div. Y. Levy.

Field 07—RESOURCES DATA

Group 7B-Data Acquisition

Limnol Oceanogr. Vol 16, No 6, p 977-980. 1971. Identifiers: *Copepods, Device, *Planktons, *Sorting.

A Perspex plankton sorter is described that can be set on the stage of a binocular microscope. A 4-way casing fitted with a 1-way cock allows the sorting of living copepods from a large volume of water without use of a pipette, avoiding thermal stresses.—Copyright 1972, Biological Abstracts,

7C. Evaluation, Processing and Publication

ESTUARIES, BAYS AND COASTAL CURRENTS AROUND PUERTO RICO, Puerto Rico Univ., Mayaguez. Water Resources For primary bibliographic entry see Field 05B. W73-01974

WATER QUALITY CRITERIA DATA BOOK VOLUME 3: EFFECTS OF CHEMICALS ON
AQUATIC LIFE, SELECTED DATA FROM THE
LITERATURE THROUGH 1968.
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 05C.

A METHOD OF MATHEMATICAL MODELING OF COMPLEX ECOLOGICAL SYSTEMS, For primary bibliographic entry see Field 05B. W73-02032

CREST-STAGE GAGING STATIONS IN OREGON--A COMPILATION OF PEAK DATA COLLECTED FROM OCTOBER 1952 TO SEP-TEMBER 1972. Geological Survey, Portland, Oreg.
J. Friday.
Geological Survey Open-file Report, October

1972. 115 p, 7 fig, 1 tab.

Descriptors: *Peak discharge, *Streamflow, *Crest-stage gages, *Basic data collections, 'Oregon, Small watersheds, Hydrologic data, An-nual peak discharge, Discharge (Water), Flow rutes Identifiers: Compilation data.

Peak-flow data were collected at 230 crest-stage gaging stations and 73 miscellaneous sites in Oregon from October 1952 to September 1972. Gaging-station records consist of a brief description of the location and physical features of each site, and a compilation of annual peak discharges during the period of record. Basin characteristics, such as the mean elevation of the basin, channel slope, and the vegetal and geological features, are given if they have been evaluated. These records supersede previously published data. Sometimes minor revisions of data become necessary because of additional rating definition or because of gradual changes in site properties. (Woodard-USGS) W73-02034

HYDROLOGIC DATA COLLECTION VIA GEOSTATIONARY SATELLITE, National Weather Service, Silver Spring, Md. For primary bibliographic entry see Field 67A. W73-02036

CHEMICAL ANALYSES OF WATER FROM WELLS IN HARRIS COUNTY, TEXAS, 1922-71, Geological Survey, Austin, Tex. For primary bibliographic entry see Field 02K. W73-02038

WATER RESOURCES DATA FOR COLORADO, 1971: PART 2. WATER QUALITY RECORDS. Geological Survey, Lakewood, Colo. For primary bibliographic entry see Field 02K. W73-02039

GROUND-WATER CONDITIONS IN ANDER-SON, CHEROKEE, FREESTONE, AND HEN-DERSON COUNTIES, TEXAS. Guyton (William F.) and Associates, Austin, Tex.

Texas Water Development Board Report 150, August 1972. 250 p, 67 fig, 18 tab, 55 ref.

Descriptors: "Groundwater resources, "Water yield, "Water wells, "Water quality, "Texas, Aquifer characteristics, Hydrologic data, Weldata, Data collections, Water utilization, Groundwater recharge, Chemical analysis, Water levels.

Water recharge, Chemical annayss, Water levels.

Groundwater resources are investigated in Anderson, Cherokee, Freestone, and Henerson Counties in east Texas. The geologic units which constitute the principal aquifers are the Wilcox Group, Carrizo Sand, Queen City Sand, and Sparta Sand. Nearly all the municipal and industrial groundwater supplies are from either Wilcox or Carrizo wells. The maximum depth of occurrence of fresh water in the Wilcox is in excess of 2,000 feet in south-central Anderson County. Yields of individual wells range from a few gallons per minute nearly 1,200 gpm. Total estimated pumpage from Wilcox wells in 1969 was 5.5 million gallons per day. The estimated total supply available from Wilcox wells is 48 mgd. In the Carrizo Sand, yields of individual wells are as much as 700 gallons per minute. Estimated pumpage from the Carrizo was 5.5 million gallons per day in 1969. The estimated potential yield of the Carrizo towells is 53 million gallons per day in 1969. The estimated potential yield of the Carrizo towells is 35 million gallons per day. No evidence was found of any gallons per day. No evidence was found of any serious, widespread contamination of ground-water from oil-field brines. (Woodard-USGS) W73-02049

POLLUTION OF SUBSURFACE WATER BY SANITARY LANDFILLS. VOL 2, Drexel Univ., Philadelphia, Pa. For primary bibliographic entry see Field 05B. W73-02106

POLLUTION OF SURFACE WATER BY SANI-TARY LANDFILLS. VOL 3, Drexel Univ., Philadelphia, Pa. For primary bibliographic entry see Field 05B.

MONITORING NEW YORK'S WATER AUTO-MATICALLY, New York State Dept. of Environmental Conservation, Albany. Water Quality Surveillance Sec-

For primary bibliographic entry see Field 05G. W73-02135

SEDIMENT STREAMS, YIELDS OF WISCONSIN Geological Survey, Madison, Wis. S. M. Hindall.

Geological Survey Open-file Report, 1972. 1 sheet,

Descriptors: *Sediment transport, *Sediment yield, *Streams, *Wisconsin, Suspended load, Particle size, Bed load, Hydrologic data, Data collections, Streamflow, Gaging stations, Flow rates, Sampling. Identifiers: Sediment source.

Sediment data are summarized from 80 streamagging sites throughout Wisconsin and from the files of the Wisconsin district, Water Resources Division, U.S. Geological Survey, through the 1971 water year. Sediment yields were determined from water-sediment samples collected at streamgaging stations and analyzed for suspended-sediment concentration. The instantaneous
suspended-sediment discharges were determined
and related, through sediment-transport curves, to
the flow-duration curves for the streams. The
short-term annual suspended-sediment yields were
computed for the period of sediment record
through the 1971 water year. The long-term
suspended-sediment yields were determined by
adjusting the short-term yields to a 10-year base
period. Particle-size data were collected at 34 sites.
Both suspended and bed-material samples were
analyzed for particle-size distribution. Median
grain sizes, sorting coefficients, and probable
sources of sediment were determined. The probable sediment sources are general; specific source
data are difficult to obtain and are meaningful only
in small bassins. (Woodard-USGS)
W73-02152

MODEL OF PRESSURE RIDGE FORMATION

Washington Univ., Seattle. Dept. of Aeronautics and Astronautics. and Astronautics.
For primary bibliographic entry see Field 02C.
W73-02172

A HYRRID COMPUTER PROGRAM FOR PREDICTING THE CHEMICAL QUALITY OF IRRIGATION RETURN FLOWS,
Ohio Univ., Athens. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B. W73-02177

INDEX OF SURFACE WATER STATIONS IN TEXAS, OCTOBER 1972. Geological Survey, Austin, Tex.

Geological Survey Data Report, 1972. 26 p. 1 plate, 6 tab

Descriptors: "Indexing, "Data collections, "Surface waters, "Stations, "Texas, Gaging stations, Streamflow, Water quality, Water analysis, Pesticides, Chemical analysis, Low flow, Lakes, Reservoirs, Crest-stage gages, Water levels, Tides, Estuaries, Organic compounds, Biological properties, Sediment yield.

This index of surface-water stations in Texas shows the station number and name, type of record collected, and the office at which the basic record collected, and the office at which the basic data are filed. In operation as of October 1, 1972, were 487 streamflow, 75 reservoir-content, 14 stage, 110 low-flow partial-record, 185 crest-stage partial-record, 11 periodic water-quality, 3 miscel-laneous, 27 tide-level, 111 chemical-quality, 25 continuous-recording water-quality, 187 periodic chemical-quality, 189 periodic organic-quality, 105 pesticides, 10 sediment, 37 periodic sediment, 32 periodic biological, and 55 reservoir inventory stations. The U.S. Geological Survey's investigations of the water resources of Texas are conducted in cooperation with the Texas Water Development Board, Texas Highway Department, river authorities, cities, U.S. Corps of Engineers, Bureau of Sport Fisheries and Wildlife, Environmental Protection Agency, U.S. Soil Conservation Service, and others. (Woodard-USGS)

LOW-FLOW STUDY OF STREAMS IN ALBANY COUNTY, NEW YORK, Geological Survey, Albany, N.Y. F. L. Robison. Geological Survey Open-file Report, 1971. 24 p, 6

Descriptors: *Streamflow, *Low flow, *Water quality, *Data collections, *New York, Hydrologic data, Sampling, Stream gages, Discharge measurement, Rainfall, Base flow.

Identifiers: *Albany County (N Y).

In 1967, th Geological program to of Albany (low-flow de low-flow di 1970. As pi Geological measureme: September: correspondi feet per sec are tabulate mate of the flows is inc surements, were collect analyses, di to 824 mg/li dissolved-so the U.S. Pi limit for drin W73-02318

ANNUAL C CREEK, TR Geological S B. B. Hampt Geological S port, August

Descriptors: (Basins), *I protection, Basic-data o Storms, Peal tection, Eng Small waters Identifiers: County (Tex

Rainfall, run the 1970 wat above the st near Aubrey of floodwate instrument in eleven flood emergency s square miles, stream-gagin 1970 water y 14-year (195 yearly mean the year was were selecte computations of rainfall an curves are inc W73-02324

AVERAGE VIN MAINE, Geological Su G. S. Hayes. For sale by U 75 cents. Geo ns Atlas H.

criptors: *Water yiel Precipitation Snow survey stratification, Identifiers: *S

Efficient man Maine requirement water tempora will augment May precipita of equal avera I can be used water content In 1967, the city of Albany, N.Y., and the U.S. Geological Survey began an enlarged cooperative program to evaluate the surface-water resources of Albany County. An analysis is presented of the low-flow data that the program has obtained to 1970. As part of this program, personnel of the Geological Survey made two series of base-flow measurements of many streams on August 19 and September 23, 1970. These measurements and the corresponding runoff values expressed as cubic feet per second per square mile of drainage area re tabulated. At many sites, where additional measurements had previously been made, an estimate of the frequency of occurrence of certain bow flows is included. In addition to discharge measurements, water samples for chemical analyses, dissolved-solids content ranged from \$2\$ to \$24 mg/liter. Twenty-four of the samples had a dissolved-solids content of less than 500 mg/liter, to U.S. Public Health Service's recommended limit for drinking water. (Woodard-USGS)

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1970, Geological Survey, Austin, Tex.

Geological Survey, Austin, 1 ex.

B. B. Hampton.
Geological Survey Texas District Open-file Report, August 1972. 100 p, 2 fig, 11 tab.

Descriptors: "Hydrologic data, "Watersheds (Basins), "Rainfall-runoff relationships, "Flood protection, "Texas, Watershed management, Basic-data collections, Streamflow, Flow rates, Storms, Peak discharge, Flood control, Flood protection, Engineering structures, Stream gages, Small watersheds.

Identifiers: "Little Elm Creek (Tex.), "Collin County (Fex.) "Deption County (Fex.)

County (Tex), *Denton County (Tex).

Rainfall, runoff, and storage data collected during the 1970 water year for the 75.5-square-mile area above the stream-gaing station Little Elm Creek near Aubrey, Texas are presented. The locations of floodwater-retarding structures and hydrologic-instrument installations in the area are shown. The instrument installations in the area are shown. The eleven floodwater-retarding structures have a combined capacity of 9,940 core-feet below the emergency spillway and control runoff from 28.9 square miles, or 38% of the area above the Aubrey stream-gaging station. Average rainfall during the 1970 water year was 43.18 inches, or 115% of the 14-year (1937-70) average of 37.41 inches. The yearly mean discharge was 64.4 cfs. The runoff for the year was 46,620 acre-feet. Three storm periods were selected for detailed computations. These computations include a detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are included. (Woodard-USGS) W73-02324

AVERAGE WATER CONTENT OF SNOWPACK IN MAINE, Geological Survey, Washington, D.C.

G. S. Hayes. For sale by USGS, Washington, D C 20242; Price 75 cents. Geological Survey Hydrologic Investiga-tions Atlas HA-452, 1972. 1 sheet, 4 fig.

Descriptors: *Snowpacks, *Water equivalent, *Water yield, *Hydrologic data, *Maine, Precipitation (Atmospheric), Data collections, Snow aurveys, Snowmelt, Snow cover, Density stratification, Maps, Curves. Identifiers: *Snowpack water content (Maine).

Refficient management of the water resources of Maine requires a knowledge of the amount of water temporarily stored in the snow cover, which will augment the runoff from the March through May precipitation. A map of Maine showing lines of equal average water content of snow for March I can be used to determine the average March I water content of snow at any point within the

State. This map was developed from the annual maps for the 25-year period 1941-65. Another map of Maine has lines of equal average snow density on March 1 and lines of equal average date of maximum accumulation of water content. Curves show the average density with respect to time and the average water content of snow during the winter months at the Middle Dam and Telos Dam snow courses. The water-content curves can be used as indicators of the average water content of snow at any date for any site in the northern two-thirds of the State. The amount as shown by the curves must be decreased for points in the southern third of the State. (Woodard-USGS) W73-02326

FLOODS IN THE AGUADILLA-AGUADA AREA, NORTHWESTERN PUERTO RICO, Geological Survey, Washington, D.C. K. G. Johnson.

R. G. Johnson.

For sale by USGS, Washington, D C 20242; Price \$1.00. Geological Survey Hydrologic Investigations Atlas HA-457, 1972. 1 sheet, 2 fig, 1 map, 1 tab.

Descriptors: "Floods, "Flood data, "Flood profiles, "Puerto Rico, "Hydrologic data, Maps, Flood plains, Flood peak, Rivers, Historic floods, Flood floods, Flood floods, Flood floods, Flood floods, Flood control, Streamflow. Identifiers: "Aguadilla-Aguada area (P R), "Rio Culebrinas (P R).

A compilation of hydrologic data pertaining to flooding along lower Rio Culebrinas in Puerto Rico is based upon information obtained from residents in the study area and field surveys by the U.S. Geological Survey. The study area lies in the northwestern part of Puerto Rico between the towns of Aguadilla and Aguada. It is a relatively small valley devoted largely to the production of sugarcane. The flood plain of lower Rio Culebrinas has been inundated extensively at least three times aince 1928. The greatest known flood occurred on September 13, 1928. The flood of July 1, 1960, caused damage in a small section of the city of Aguadilla. The flood of November 27, 1968, was only about 0.1 meter lower than the flood of 1928. Aguadilla. The flood of November 27, 1968, was only about 0.1 meter lower than the flood of 1928. The profile of the water surface for the flood of 1968, on Rio Culebrinas and on Rio Cano, a tributary that flows into Rio Culebrinas 1.5 km upstream from highway 2 during normal flow, is shown. Water-surface contours based on floodmarks of the 1968 flood are shown on a topographic programment of the programment of the 1968 flood are shown on a topographic programment. graphic map. These lines are a representation of equal elevations of the water surface and are normal to the direction of flow. (Woodard-USGS) W73-0232.

A RANDOM-WALK SIMULATION MODEL OF ALLUVIAL FAN DEPOSITION, Arizona Univ., Tucson. Dept. of Hydrology and Water Resources. For primary bibliographic entry see Field 02J. W73-02342

COLLECTED REPRINTS, VOLUME II 1969-

1976. Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 04B.
W73-02347

AN ANALYSIS OF FORESTED WATERSHED LAND OF THE CAPE FEAR RIVER BASIN USING A COMPUTER-ORIENTED ALPHANU-MERIC MAP INFORMATION ASSEMBLY AND DISPLAY SYSTEM, Worth Carolina State Univ., Raleigh. School of

Forest Resources.

W. M. Robinson.
M.Sc. Thesis, 1972. 135 p, 4 fig, 20 tab, 37 ref, 9 append. OWRR B-010-NC (2).

Descriptors: *Maps, *Analytical techniques, *Duta processing, *Forest watersheds, Hydrologic data, Land use, *North Carolina. Identifiers: *Alphanweric map information, *Cape Fear River Basin.

*Cape Fear River Basin.

Application of the Map Information Assembly and Display System (MIADS 2) to forest lands of the Cape Fear River Basin, North is described. Forested lands were stratified according to soil group, land use, forest type, disturbance factor, previous agricultural use, and future use (as reservoir sites). The resulting strata were mapped and encoded for computerization. A detailed description of this procedure is presented. The results include quantitative description of current land uses and conditions and estimates of current, future as-ncipated, and future potential erosion, sediment production, and water runoff. An important result is a better understanding of effects of logging, burning, road building, skid trail use, and site preparation on hydrologic conditions (including accelerated erosion). Predicted runoff was compared to recorded data on ten selected storms in two watersheds with good correlation. This was the first application of MIADS 2 to the complex forest lands of the South. The system provided quantification which was lacking in previous river basin studies. This allowed both the total effect and relative effect of various forest treatments and damages to be evaluated.

W73-02358

THE SYSLAB SYSTEM FOR DATA ANALYSIS OF HISTORICAL WATER-QUALITY RECORDS (BASIC PROGRAMS), Geological Survey, Washington, D.C.
T. D. Steele.
Contribution No 19, 1972. 70 p, 6 fig, append.
WFD-31.F.

WRD-31-F

Descriptors: *Computer programs, *Data processing, *Water quality, Data collections, Basic data collections, Publications, Data storage and retrieval. Identifiers: Syslab programs, U.S. Geological Sur-

The basic computer programs comprising the SYSLAB system for systematically analyzing historical water-quality records are presented. The SYSLAB system for systematically analyzing historical water-quality records are presented. The first computer program retrieves station records for sets of water-quality variables from the U.S. Geological Survey's surface-water quality files. Once the appropriate data are assembled, the procedure for analyzing water-quality data commonly has the following sequence: (1) a summary of basic statistics for each water-quality variable for the period of record or for shorter time increments, (2) plots of values of selected data pairs scaled according to the range of the data in order to check for outliers or anomalous values and to find interrelationships, and (3) regression relationships based upon the graphic analysis of the plots. The appropriate SYSLAB computer program is given for each step in the sequence. Derivation of regression relationships is particularly applicable for the major inorganic chemical constituents which frequently are highly correlated with specific conductance. In addition to a description of the card set-up formatting and data input requirements for each computer program in the SYSLAB system, a listing of the source program is included, along with sample deck set-ups and resultant program output, as an appendix to the documentation for the program. (Knapp-USGS) W73-02437

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS, METROPOLITAN AREA, 1970, Geological Survey, Austin, Tex. G. R. Dempster, Jr., and B. C. Massey. Geological Survey Open-file Report, 1972. 89 p, 3 fig, 5 tab.

Field 07—RESOURCES DATA

Group 7C—Evaluation, Processing and Publication

Descriptors: "Rainfall-runoff relationships, "Urban hydrology, "Storm runoff, "Texas, "Hydrologic data, Data collections, Streamflow, Stream gages, Flow rates, Peak discharge, Rain gages, Urbanization, Land use, Urban drainage, Hydrographs, Mass curves.
Identifiers: "Fort Worth (Tex).

Identifiers: *Fort Worth (Tex).

Basic hydrologic data collected in four study areas near Fort Worth, Texas during the 1970 water year are presented. The four study areas within the metropolitan area are Dry Branch, Little Fossii Creek, Sycamore Creek (above Interstate Highway 820), and Sycamore Creek tributary. The Sycamore Creek tributary. The Sycamore Creek tributary study area includes the highly impervious area of the Seminary South Shopping Center as a subarea. The investigations are designed to evaluate factors affecting floods on small streams in the metropolitan area. The objectives of the program are: to determine, on the basis of historical data and hydrologic analyses, the magnitude and frequency of floods; to document and define the areal extent of floods of greater than ordinary magnitude; and to determine the effect of urban development on flood peaks and volume. The maximum discharge rates for 278 cfs at Seminary South Shopping Center (drainage area, 0.38 sq mi) to 1,370 cfs at Little Fossii Creek at Mesquite Street (drainage area, 12.3 sq mi). (Woodard-USGS)

FIELD MAPPING AND COMPUTER SIMULA-TION OF BRAIDED-STREAM NETWORKS, Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences. For primary bibliographic entry see Field 02J. W73-02490

A SUMMARY OF PEAK STAGES AND DISCHARGES IN NEW YORK FOR THE PLOOD OF JUNE 1972, Geological Survey, Albany, N.Y. For primary bibliographic entry see Field 02E. W73-02492.

HISTORY OF WATER LEVEL GAUGES, LAKE ERIE AND THE NIAGARA RIVER.

Available from NTIS, Springfield, Va 22151 as AD-741 832 Price \$3.00 paper copy; 95 cents microfiche. Report of Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data, December 1969. 89 p, 32 plate.

Descriptors: *Hydrologic data, *Water levels, *Lake Erie, *Reviews, *Gaging stations, History, Data collections, Rivers, Federal government, United States, Canada, Administrative agencies. Identifiers: *Niagara River.

The histories are presented for all gaging stations of value to the Governments of Canada and the United States that have provided Lake Eric and Niagara River water level data for various periods of time through December 1969. For each station the data include (1) a comprehensive statement as to how datums were established; (2) a chronological table listing the period when water level observations were made, the controlling bench mark and its elevations, the type of record, and the operating agency; (3) the International Great Lakes Datum (1955) elevation of the controlling bench mark or the relationship between IGLD (1955) and the previous datum established at the gaging station; and (4) description and location of the gaging station; and (4) description and location of the gaging station; and (4) description and location of mation is available. (Woodard-USGS)

PROCEEDINGS, FOURTEENTH CONFERENCE ON GREAT LAKES RESEARCH. For primary bibliographic entry see Field 02H. W73-02498

A WATER USE MAP OF THE GREAT LAKES Department of Energy, Mines and Resources, Burlington (Ontario). Canada Centre for Inland

ary bibliographic entry see Field 02H. W73-02512

RESERVOIR YIELD IN ARID REGIONS WITH LIMITED RECORDS, Lund (G. G. A.), Johannesburg (South Africa). For primary bibliographic entry see Field 02A. W73-02545

IRRIGATION MANAGEMENT-A TOOL FOR AGRIBUSINESS, Bureau of Reclamation, Denver, Colo. Water Operations Branch.
For primary bibliographic entry see Field 03F.
W73-02546

HYDROLOGIC MODELING, Illinois Univ., Urbana. Dept. of Engineering. For primary bibliographic entry see Field 02A. W73-02547

EFFICIENCY AND UTILITY OF COLLOCA-TION METHODS IN SOLVING THE PER-FORMANCE EQUATIONS OF FLOW CHEMI-CAL REACTORS WITH AXIAL DISPERSION, Kansas State Univ., Manhattan. Dept. of Chemi-cal Escicación. cal Engineering.
For primary bibliographic entry see Field 05D.
W73-02552

WEATHER VARIATIONS ON A MOUNTAIN GRASSLAND IN SOUTHWESTERN MONTANA, Forest Science Lab., Bozeman, Mont. For primary bibliographic entry see Field 02B. W73-02568

08. ENGINEERING WORKS

8A. Structures

PORT HUENEME HARBOR, VENTURA COUNTY, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif.

Available from the National Technical Informa-tion Service as EIS-CA-72-4486-D, \$4.00 in paper copy, \$0,95 in microfiche. February 1972. 28 p, 2 map, 2 photo, 4 tab, 3 append.

Descriptors: "California, "Environmental effects, "Dredging, "Harbors, "Channel improvement, Excavation, Spoil banks, Transportation, Boats, Ships, Economic impact, Basins, Turbidity, Benthos, Biochemical oxygen demand, Oil spills, Waste disposal, Navigable waters, Navigation. Identifiers: "Environmental Impact Statements, "Ventura County (Calif).

This navigation project involves the dredging to the depths of 35 feet of the Central Basin and Channel A of Port Hueneme Harbor, Ventura County, California. The project will remove approximately 160,000 cubic yards of dredge spoil, which will be used as a land fill. The improvement will increase shipping capacity of the harbor, thereby stimulating the economy within the service area. Adverse effects include increased turbidity during dredging operations; loss of organisms living on or in the bottom sediments within the project limits; regeneration of biochemical oxygen demand by the dredging, causing a temporary depression of oxygen content in the harbor waters; and increased potential for oil and other waste spillages from vessels utilizing the increased

shipping capacity. Alternatives considered include no action, increasing the size and depth of the har-bor, and improving harbor facilities. Comments have been requested from interested agencies. (El-lis-Florida) W73-01984

RAGLE-TUMBLEWEED DRAW WATERSHED, NEW MEXICO (DRAFT ENVIRONMENTAL IM-PACT STATEMENT). Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 04D. W73-01985

ALUM CREEK LAKE, ALUM CREEK, SCIOTO RIVER BASIN, OHIO (DRAFT ENVIRONMEN-TAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va.

Available from the National Technical Informa-tion Service as EIS-OH-72-4509-D, \$4.50 in paper copy, \$0.95 in microfiche. April 17, 1972. 38 p, 2 map, 1 photo, 12 tab, 18 ref.

Descriptors: *Environmental effects, *Ohio, *Dam construction, *Flood control, *Water supply, Water storage, Land use, Flood proofing, Flood pinin zoning, Flood insurance, Flood damage, Reservoirs, Levees, Recreation, Fish, Wildlife, Erosion, Sedimentation, Dams, Flow augmentation, Water management (Applied), River regulation, River training. Identifiers: *Environmental Impact Statements. Identifiers: *Environmental Impact Statements,
*Alum Creek Lake (Ohio).

The project consists of the construction and operation of a dam and other facilities for recreation, fish and wildlife conservation, Flood control and water supply on the Alum Creek in Delaware County, Ohio. The project is one unit in the comprehensive plan for water resources development in the Scioto River Basin. The project will increase the usability and productivity of lands downstream and change the land-use pattern in the project area. Creation of the lake will regulate the downstream flow and convert a reach of non-regulated stream to a lake. Construction activities have resulted in temporary accelerated erosion and lated stream to a lake. Construction activities have resulted in temporary accelerated erosion and sedimentation. Acquisition of lands needed for the project will disrupt the private and communal family environments. Alternatives considered include construction of concrete walls or earth levers as barriers against floods, improvement of existing channels, floodproofing, flood plain zoning, flood insurance, construction of a reservoir elsewhere and no action. Extensive economic data on the project were included. (Nielsen-Florida) W73-01986

LYTLE AND WARM CREEKS, SAN BERNAR-DINO COUNTY, CALIFORNIA (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif.

Available from the National Technical Informa-tion Service as EIS-CA-72-4520-F, \$3.00 in paper copy, \$0.95 in microfiche. March 1972. 59 p, 4 fig,

Descriptors: *California, *Environmental effects, *Flood protection, *Channel improvements, Flood control, Flood plains, Flood plain zoning, Flood profing, Flood damage, Floods, Urbanzation, Urban runoff, Industries, Aesthetics, Streamflow, Watercourses (Legal), Urban areas, Vegetation effects.

Identifiers: *Environmental Impact Statements,
*San Bernardino County (Calif).

The project involves construction of channel improvements along reaches of Lytle, Warm and East Twin Creeks and the Santa Ana River through parts of the cities of San Bernardino and Cotton, California. The improvements consist of

retangular revetted le provide flo sisting of property. along the c mental eff arance o of the proj project we tion. The a expensive Comments Florida) W73-01987

WHITEOA ENVIRON Army Engi Available :

tion Service copy, \$0.95

Descriptor fects, *Da tion, *Mu Flood con control, R Water stor economics Aesthetics Identifiers Whiteoak

struction a ple-purpos manageme in order to control, ge servation. developme southeast Ohio. Ber reduction ditions, a Adverse e flowing str d some of the area tives cons ternate wa Florida) W73-01990

LOCAL P PROJECT FORK OF Army Eng

Available tion Service copy, \$0.9.

Descriptor alternative plains, Fl redevelop Concrete operation, training, R training, R Matewan retangular reinforced concrete channels and stone-revetted levees. The channel improvements will provide flood protection for developed areas con-sisting of residential, commercial and industrial property. Extensive landscaping and planting along the channels are planned. Adverse environ-mental effects include loss of semi-natural ap-pearance of the water-courses, rapid urbanization of the project area and an increase of the ills as-sociated with urbanization. Alternatives to the project were considered including flood control dams, enlarging other channels, limiting the im-provements, floodproofing and zoning, and no ac-tion. The alternatives were rejected as either too provements, floodproofing and zoning, aim no action. The alternatives were rejected as either too expensive or not meeting the flood control needs. Comments and responses are included. (Nielsen-W73-01987

WHITEOAK DAM AND RESERVOIR, WHITEOAK CREEK BASIN, OHIO (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va.

Available from the National Technical Informa-tion Service as EIS-OH-72-4583-D, \$3.00 in paper copy, \$0.95 in microfiche. May 1972. 7 p.

Descriptors: "West Virginia, "Environmental effects, "Dam construction, "Reservoir construction, "Multiple-purpose reservoirs, Earth dams, Flood control, Flood protection, Water quality control, Recreation, Wildlife conservation, Fish conservation, Water supply, Dependable supply, Water storage, Engineering structures, Regional economics, Hunting, Watershed management, Aesthetics.

Identifiers: *Environmental Impact Statements, *Whiteoak Creek Basin (Ohio).

The proposed action would consist of the con-struction and operation of a dam, a 931 acre multi-ple-purpose reservoir and other facilities, and the agement of the resources on the project lands management of the resources on the project lands in order to provide for water supply, water quality control, general recreation, fish and wildlife conservation, flood control, and regional economic development. The project site is located 40 miles outbases of Cincinnaii Ohio in Brown Country. development. The project site is located 40 miles southeast of Cincinnati, Ohio, in Brown County, Ohio. Beneficial environmental effects are the reduction of flood damages, improved stream conditions, a dependable water supply, increased recreation, and hunting and fishing opportunities. Adverse effects are the loss of 7.5 miles of free flowing stream, 931 acres of upland game habitat, and some agricultural land. Also the scenic quality of the area will be affected by the project. Alterna-tives considered include other reservoir sites, alternate water supply sources, non-structural flood control activities, and no action. (Beardsley-Florida) W73-01990

LOCAL PROTECTION AND FLOODPROOFING PROJECT, MATEWAN, WEST VIRGINIA, TUG FORK OF BIG SANDY RIVER (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Huntington, W. Va.

Available from the National Technical Informa-tion Service as EIS-WV-72-4587-D, \$3.00 in paper copy, \$0.95 in microfiche. May 1972. 6 p.

Descriptors: "West Virginia, "Flood protection, "Environmental effects, "Levees, "Nonstructural alternatives, Flood damages, Flood control, Flood plains, Flood plain zoning, Relocation, Area redevelopment, Social aspects, Aesthetics, Concrete structures, Retaining walls, Reservoir operation, Water management (Applied), River training, River regulation. Identifiers: "Environmental Impact Statements, "Matewan (West Virginia), Big Sandy River.

The project at Matewan, Mingo County, West Virginia, proposes a combination of structural and non-structural means to reduce flood damages in the Tug Fork Basin. A levee and floodwall system will be constructed along the main residential and business district. Areas still susceptible to flood damages will be regulated by floodproofing or evacuation and demolition of the unprotected residences. Construction activities will temporarily increase crossion and sedimentation in the river. The adverse effect most directly impinging upon the human environment will be the demolition of houses that cannot be adequately protected from flood damage. Another adverse impact will be the visual effect of the massive levee and floodwall, mean height being 29 feet. Alternative programs considered to reduce economic loss from flood damage included reservoir control, major channel improvement or relocation, evacuation of the community and no action. These alternatives were rejected as too expensive, disruptive, or as not rejected as too expensive, disruptive, or as not preventing serious flood damage. (Nielsen-Florida)

TEHAMA-COLUSA, CENTRAL VALLEY PRO-JECT, CALIFORNIA (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as EISCA-72-4700-F, \$5.50, in paper copy, \$0.95 in microfiche. June 7, 1972. 67 p, 1 fig, 2 map, 1 photo, 3 tab, 2 append.

Descriptors: "California, "Canal construction, "Irrigation canals, "Environmental effects, Spawning, Semiarid climates, Vectors, Disease, Turbidity, Habitat improvement, Wildlife, Wildlife habitats, Water supply, Irrigation, Flooding, Fisheries, Fish management, Fish reproduction, Waterfowl, Social aspects.

Identifiers: "Environmental Impact Statements, "Central Valley Project."

Valley Project.

The project involves the construction of the 122 mile Tehama-Colusa Canal on the west side of the Sacramento Valley, in California. The Canal will serve to irrigate approximately 244,500 acres in the Tehama-Colusa service area and will include dual and single-purpose spawning channels for 13 miles. The area is now dry farmed or dependent upon ground water. The net long-term effect of the project will be favorable to wildlife, however, there will be some changes in wildlife habitats and some temporary losses in wildlife distribution. The fish spawning facilities will discharge some nutrients and turbidity to the river. Spawning gravels for 3,000 salmon have already been inundated. The potential will exist for a larger popula-tion of water associated pests and potential dis-ease vectors. Considered as alternatives to this proposal were the pump plan, single-purpose irrigation, the selected plan and no development of the area. The present plan was selected as being the most feasible and useful. A long-term enhancement of the Sacramento River fishery as well as an improvement in water-fowl habitat and water service for the agricultural area will result from im-plementation of the project. (Reed-Florida) W73-01994

HEMPSTEAD HARBOR, NEW YORK NAVIGA-TION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, New York.

Available from the National Technical Informa-tion Service as PB-199 879D, \$3.00 in paper copy, \$0.95 in microfiche. March 1971. 7 p, 1 map.

Descriptors: *New York, *Environmental effects, *Harbors, *Dredging, Recreation, Navigation, Water circulation, Materials, Water utilization,

Channels, Channel improvement, Turbidity, Ships, Navigable waters, Water quality, Boating, Recreation demand, Oil spills. Identifiers: "Environmental Impact Statements, "Hempstead Harbor (N.Y.), "Turning basin.

Hempstead Harbor, New York, located on the north shore of Long Island, consists of a 3 mile long outer harbor and a 1.9 mile long inner harbor. The existing channel is 6 feet deep at mean low water and is inadequate to handle waterborne commerce at this level. The restricted channel depths, in addition to causing delays and congestion within the harbor, are instrumental in congributing to the harbor's nollution problem. The gestion within the harbor, are instrumental in contributing to the harbor's pollution problem. The proposed project involves dredging the existing channel to a mean low water depth of 13 feet. Additionally, the project authorizes the construction of a 9 foot deep turning basin to handle the larger commercial vessels. Hempstead Harbor is located in the center of a recreational boating area, and the enlargement of the channel will be beneficial by reducing pollution caused by accidents and increasing water circulation in the harbor. Adverse effects from the project will be limited to temporary suspension of bottom materials during dredging operations. Alternative solutions considered included other plans providing different channel depths, and a no-action alternative. (Bradley-Florida) W73-01995 W73-01995

ENGINEERING GLACIOLOGY (INZHENER-NAYA GLYATSIOLOGIYA). For primary bibliographic entry see Field 02C. W73-0206

GEOLOGY AND DAMS. VOLUME IV. All-Union designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR).

Available from the National Technical Informa-tion Service as TT70-59127, \$6.00 paper copy, \$0.95 in microfiche. Translated from Russian for 30.95 in microfiche. Translated from Russian for National Science Foundation and Department of Interior, Bureau of Reclamation, 1970, 306 p. (Originally published by Vsesoyuznyy Gosudarst-vennyy Proyektnyy Institut 'Gidroener-goproyekt', Moscow, A. A. Borovog, editor.).

Descriptors: *Geology, *Engineering geology, *Engineering structures, *Dams, Dam construction, Dam design, Damsites, Dam foundations, tion, Dam design, Damsites, Dam founcations, Hydroelectric plants, Rocks, Rock properties, Soils, Groundwater, Construction materials, Concrete structures, Spillways, Tunnels, Borehole geophysics, Subsurface investigations, Mapping. Identifiers: *USSR, Tectonics.

The fourth volume of 'Geology and Dams' examines the engineering-geologic factors which must be considered in the design and operation of dams. Application of geology to damsite selection involves detailed investigations of the geologic structure of terrains. Inspection of rock outcrops and extensive underground exploration by means of test holes, core drilling, and geophysical methods are described together with the difficulties encountered in the construction of dams in different parts of the USSR. (Josefson-USGS) W73-02067

DRILLING AND GROUTING EXPERIENCES IN UNDERGROUND CONSTRUCTION, Bureau of Reclamation, Denver. Colo.

L. R. Gebhart.

Paper presented at International Symposium on Protection of Underground Construction Against Water, Bratislava, Czechoslovakia, June 1972. 25 p. 4 fig. 1 photo, I dwg. 1 chart.

Descriptors: *Grouting, *Construction methods, *Faults (Geology), High pressure, *Underground structures, Construction, Tunneling, Rock bolts,

Field 08—ENGINEERING WORKS

Group 8A—Structures

Tunnel supports, Tunnel linings, Emulsions, Leakage, Drilling, Abutments, Grout curtains, Consolidation, Lime.

Consonation, Lime. Identifiers: "Cationic asphalt, Grouting pressure, Asphalt emulsions, Grout mixes, Charles H. Boustead Tunnel (Colorado), Lake Mead, Morrow Point Dam (Colorado), Southern Nevada Water Project, Lake taps.

The grouting procedures used for different problems on 3 unrelated projects are reviewed. At each location, drilling and grouting were used to reduce flow of water or to stabilize the material. The first problem involved grouting ahead of the advancement of a 14-ft horseshoe tunnel (10.5 ft dia after lining with concrete) through a massive shear zone approximately 155 ft thick while tun-neling under the Continental Divide. The second problem involved grouting ahead in a tunnel that taps Lake Mead, drilling fan holes from the sur-face to grout the lake tap area, and drilling a 12-ftdia hole from a barge to intersect the tunnel tap for the Southern Nevada Water Project. The third problem was an experiment in using a cationic asphalt emulsion to seal excessive leakage occurring around the left abutment of Morrow Point Dam beyond the limits of a cement grout curtain.
These problems and the solutionfor each are described. (USBR) W73-02070

THE ASPHALTIC LINING OF DUNGONNEL

DAM.

Ferguson and McIlveen, Belfast (Northern Ire-F. F. Poskitt.

Institution of Civil Engineers, Proceedings, Vol 51, p 567-579, Mar 1972. 2 fig, 3 tab, 4 ref.

Descriptors: *Reservoir leakage, *Rockfill dams, *Bituminous materials, *Linings, Reservoir design, Reservoir construction, Asphalt, Cutoff walls, Embankments, Seepage, Seepage, Seepage control, Binders, Sprays, Paving.

Identifiers: *Impervious linings, Asphalt emulsions, Sealing compounds, Bituminous concretes, Grout curtains, Northern Ireland, Asphaltic bitu-

mens. Impervious layers.

Design and construction of an asphalt lining for Dungonnel Dam, built in 1968-70 in Northern Ire-land, are described. The dam, constructed as a rockfill embankment, was made impermeable by an asphalt lining placed on the upstream face and connected to an underlying cutoff wall and grout curtain. The lining consists of 2 layers of impermeable asphalt concrete and an interposed layer of porous bituminous macadam, with drains for collecting and measuring leakage through the outer impermeable layer. Included are: (1) details of the lining: (2) descriptions of the lining; (2) descriptions of the properties of materials; (3) placement techniques used; (4) experiences gained; and (5) unit costs of construction. (USBR)

THE UNDERSEA AQUEDUCT-A NEW CONCEPT IN TRANSPORTATION,
Bureau of Reclamation, Washington, D.C.

But east of Newstrong.

Transportation Engineering Journal, American
Society of Civil Engineers, Vol 98, No TE2, p 303310, May 1972. 5 fig, 3 ref, append.

Descriptors: *Aqueducts, Water transportation, *Water resources development, *Underwater, Investigations, Continental shelf, Plastic pipes, Marine microorganisms, Construction methods, Inspection, Maintenance, Monitoring, Pipes,

Inspection, Maintenance, Monitoring, Pipes, Ecology, Fish, Anchors aqueduct (Collective), Submarine pipelines, *Underwater construction, Anchor cables, Organisms, Marine biology, Offshore structures, Pipe laying, Underwater structures, Underwater foundations.

Growing imbalances between available water Growing imbalances between available water sources and growth areas requiring large volumes of high quality water lend a new urgency to the need for exploring alternatives for transporting fresh water across great distances. Environmental values and increased right-of-way and maintenance costs weigh against surface facilities. In coastal areas, where long distances separate supply sources from demand areas, water may be conveyed through a submerged offshore aqueduct. The aqueduct would provide a natural hydraulic head and other benefits over conventional facilities. Pice materials, construction and maintenance ties. Pipe materials, construction and maintenance methods, anchoring systems, and the ecologic considerations of such a system are explored. W73-02076

MERSEY KINGSWAY TUNNEL: CONSTRUC-

TION, Nutall (Edmund) Ltd. (England); and Mott, Hay

And Anderson (England).
J. C. McKenzie, and G. S. Dodds.
Institution of Civil Engineers, Proceedings, Vol
51, p 503-533, Mar 1972. 15 fig, 1 photo, 2 tab.

Descriptors: *Tunnel construction, *Tunneling machines, Tunnel design, Tunnels, Tunneling, Precast concrete, Cast iron, Tunnel linings, Erection, Grouting, Faults (Geology), Inflow,

Identifiers: *Vehicular tunnels, Tunnel supports, Great Britain, Pilot tunnels, Underwater tunnels, Concrete linings.

Described is the construction of Tunnel 2A, opened in June 1971 for vehicular traffic, under the River Mersey between Wallasey and Liverpool, Great Britain, and of a parallel tunnel, 2B, under construction. A pilot tunnel was completed; then a Robbins 371 Mole was used for driving a 33ft 11-in.-dia bore. The machine-driven tunnel was lined with precast concrete segmental rings and a short reach of tunnel was hand driven and lined with cast iron segmental rings. Progress was slow because of construction problems, such as overbreaks at the tunnel crown, large water inflow, rock falls in the pilot tunnel, and the dangers and difficulties of erecting the upper lining segments. Other problems described are: (1) treatment of a major fault; (2) changing of the main bearing of the mole; and (3) repair of severe damage to the mole caused by breakage of a pinion, all occurring near midriver. Construction of the road deck, the com-plex of ventilation shafts and passages on each shore of the river, and a turnout area at midriver, anore or the river, and a turnout area at midriver, are discussed. Experiences gained in driving Tunnel 2A, several modifications on the mole, and improve tunneling techniques, enabled Tunnel 2B to be driven at a much greater speed. (USBR) W73-02078

UPLIFT COMPUTATIONS FOR MASONRY

DAMS, Fenco, Toronto (Ontario). G. D. Ransford.

La Houille Blanche, Vol 27, No 1, p 14, 65-71, 1972. 2 fig, 7 ref, 2 append.

Descriptors: *Uplift pressure, *Drains, *Gravity dams, Dam design, Pore pressure, Darcys law, Seepage, Concrete dams, Percolation, Equations, Masonry dams, Computation.

Identifiers: Canada, Diameters, Underdrains,

Spacing, Drain spacing

The importance of uplift in design of dams has caused measurement of pore pressures at the base of gravity dams and incorporation of findings into empirical design assumptions. An analytical solution, considering equally spaced drains, is shown to be possible under Darcy's law of seepage. The theory considers diameter and spacing of drains, and assumes a linear variation of pressure from upstream face of the dam to the drain as well as

from the drain to downstream toe. Using the from the drain to downstream toe. Using the method of images, an equation is developed for a value P as a measure of relative efficiency of the drain in reducing uplift. Using the equation seems preferable to rules-of-thumb empirical ap-proaches. (USBR)

POLYETHYLENE PIPE USED FOR 36-IN SEWAGE OUTFALL. For primary bibliographic entry see Field 05D. W73-02188

TAYLORS BAYOU, TEXAS, DRAINAGE AND FLOOD CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Galveston, Tex.

Available from the National Technical Informa-tion Service as EIS-TX-72-4564-F, \$5.25 in paper copy, \$0.95 in microfiche. February 1, 1972. 50 p, 1 map, 4 tab, 1 append.

Descriptors: "Texas, "Environmental effects, "Flood control, "Drainage systems, "Gulf coastal plain, Drainage practices, Drainage programs, Water management (applied), Watersheds (basins), Drainage effects, Diversion structures, Flood protection, Turbidity, Sedimentation, Water quality, Fisheries, Stream improvement, Channels, Bayous, Marshes, Channel improvement, Dredging, Watershed management, ment, Dredging, Watershed management, Drainage engineering. Identifiers: *Environmental Impact Statements, Taylors Bayou (Texas).

This project involves the enlargement of 1.8 miles of the GULF Intracoastal Waterway, the outfall canal from Taylors Bayou to the waterway, Taylors Bayou, Hillebrandt Bayou, Pivitot Bayou, Bayou Din, Willow Marsh Bayou and Mayhew Bayou. A diversion channel from the lower part of Taylors Bayou to the waterway with a gated struc-Taylors Bayou to the waterway with a gated struc-ture to prevent salt water intrusion is also in-cluded. Spoil will be placed in adjacent swamp and marsh areas and along the lower reaches of Taylor Bayou. The project will provide flood control and major drainage to Taylors Bayou in Jefferson major dramage to taylors bayou in Jenterson County, Texas, and flood protection to Beaumont, Texas. The drainage improvements are expected to enhance the area's agricultural productivity. Spoil disposal will eliminate 625 acres of coastal Spoil disposal will climinate 023 acres of coasial marsh and prairie habitat and temporarily remove 1,570 acres from use as a wildlife habitat. Construction will convert 1,610 acres from land to water use. Dredging, by temporarily increasing turbidity and sedimentation in the streams, will adversly affect water quality and impair fish spawning, nursery and foraging areas. Alternatives considered include foregoing action, varied stream dimensions and alternate spoil sites. Comments from various agencies are included. (Ellis-Florida) W73-02230

DREDGING AND FILLING, COWIKEEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (DRAFT ENVIRONMENTAL (DRAFT STATEMENT).

Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W73-02233

BUCKS HARBOR, MACHIASPORT, MAINE (FINAL ENVIRONMENTAL IMPACT STATE-MENT).
Army Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Informa-tion Service as EIS-ME-72-4561-F, \$3.25 in paper copy, \$0.95 in microfiche. May 1, 1972. 19 p, 1

Descripto sachusetts ovemen provement and water and Harb fishing, W tidal areas Disposal. *Machias

The proper southwest Maine. Th yards, will compare i Water Qu ceptability found acc prove the an ancho necessary the inner resulting habitat of but the b The wat dredging tidal zone only alter anchorag pact. (Be

> BOXELI COLOR VIRONA Soil Con For prim

HAMLI

TIVE BI

LAKE (STATE Army E Availabl tion Ser copy, \$0

Descript protectic Swimmi sion, Le bidity, Aesthet Breakw Identific Lake Control

The pro

further

frontage York. major s taminat in the a yards o The pro mental fill fro jacent designe clude: aesthet dust di Descriptors: *Environmental effects, *Mas-sachusetts, *Harbors, *Dredging, Channel im-provement, Spoil banks, Coastal engineering, In-land waterways, Excavation, Navigation, Rivers and Harbors Act, Transportation, Commercial fishing, Water utilization, Aquatic habitats, Inter-tidal areas, Turbidity, Boats, Anchors, Benthos, Disposal.
Identifiers: *Environmental Impact Statements,
*Machiasport (Maine), *Anchorage.

The proposed project involves the dredging of an eleven-acre anchorage, eight feet deep along the southwesterly side of Bucks Harbor, Machiasport, southwesterly side of Bucks Harbor, Machiasport, Maine. The dredged material, about 48,000 cubic yards, will be placed on an approved offshore site. The material dredged was subjected to tests to compare it with criteria established by the Federal Water Quality Administration for determining acceptability of dredged spoil disposal and was found acceptable. The project is designed to improve the commercial fishing capability of the harbor, thus benefiting the local economy. Providing an anchorage in the outer harbor will make it unpressary for fishermen to ground their boats in necessary for fishermen to ground their boats in the inner harbor to protect them from storms resulting in a saving of time. The plant and animal resulting in a saving of time. The plant and animal habitat of the bottom will be temporarily disturbed but the bottom life will quickly re-establish itself. The water turbidity will be increased during dredging operations. Tidal circulation of the inter-tidal zone will not be affected by the dredging. The only alternative would be to vary the design of the anchorage. This was not considered worthwhile as it would not lessen the minimal environmental impact. (Beardsley-Florida) W73-02234

BOXELDER CREEK WATERSHED PROJECT, COLORADO AND WYOMING (FINAL EN-VIRONMENTAL IMPACT STATEMENT). Soil Conservation Service, Washington, D For primary bibliographic entry see Field 04D. W73-02235

HAMLIN BEACH STATE PARK COOPERA-TIVE BEACH EROSION CONTROL PROJECT, LAKE ONTARIO, MONROE COUNTY, NEW YORK (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Buffalo, N.Y.

Available from the National Technical Informa-tion Service as EIS-NY-72-4596-D, \$3.00 in paper copy, \$0.95 in microfiche. June 1, 1972. 9 p, 1 map.

Descriptors: *New York, *Beach erosion, *Shore protection, *Environmental effects, Scenery, Swimming, Water pollution, Beaches, Soil erosion, Legislation, Community development, Turbidity, Recreation, Recreation demand, Aesthetics, Sedimentation, Social aspects, Parks, Prophysics Grains (Structure).

Aestinetics, Geninetication, Social aspects, Fairs, Breakwaters, Groins (Structures). Identifiers: *Environmental impact statement, *Lake Ontario, N.Y., *Hamlin Beach Erosion Control Project, Sand fill, Groins.

The project involves the creation of a sand beach and the construction of gr ins to protect against further erosion of a portion of the Lake Ontario frontage of Hamlin Beach State Park, in New trontage of Hamm Beach State Park, in New York. The park is far enough removed from the major sources of pollution to be free from the contamination that has forced the few public beaches in the area to close. Approximately 250,000 cubic yards of sand fill will be used along 4,250 feet of beach frontage. Seven groins will be constructed. The proposed action will not change the environmental aspects of the park frontage. Any losses of fill from the improvement will provide the ad-jacent beaches with nourishment. The groins are jacent beaches with nourishment. The groins are designed to retain sand. Adverse effects will in-clude: temporary turbidity during construction, aesthetic disfigurement of the park, and noise and dust during construction. Considered as alterna-tives were offshore breakwaters, which were aesthetically unacceptable; the use of groins, which would have failed to provide adequate beaches; and no action at all, which would cost \$100,000 annually in lost recreational benefits. The project is designed to meet the needs of expected population increases. (Reed-Florida) W73-02261

MAINTENANCE DREDGING, CHATHAM (STAGE) HARBOR, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Corps of Engineers, Waltham, Mass. New England Div. For primary bibliographic entry see Field 04A. W73-02262

SUNRISE SUBWATERSHED, LITTLE SIOUX FLOOD PREVENTION PROJECT, IOWA (DRAFT ENVIRONMENTAL IMPACT STATE-MENT).

SIGNA).
Solva J.

Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-02263

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (DRAFT ENVIRONMENTAL IM-PACT STATEMENT). Army Engineer District, Louisville, Ky.

Available from National Technical Information Service as EIS-KY-72-4724-D, \$5.50 in paper copy, \$0.95 in microfiche. May 1972. 66 p, 2 map, 10 tab.

Descriptors: *Kentucky, *Environmental effects, *Dam construction, *Multiple-purpose reservoirs, *Flood control, Flood protection, Dams, Impoundments, Recreation, Water quality control, Water supply, Area redevelopment, Fish conservation, Wildlife conservation, Land use, Floods, Flood damage, River regulation, Water control, Water resources development, Non-structural alwater resources uevenopment, Non-structural at-ternatives, Levees, Channel improvement, Water management (Applied), Watershed management. Identifiers: *Environmental Impact Statements, *Camp Ground Lake (Kentucky), Salt River Basin

The Camp Ground Lake project in the Salt River Basin, Kentucky, would consist of the construction and operation of a dam and a multi-purpose reservoir. The project is designed for recreation, flood control, water quality control, water supply, fish and wildlife conservation and redevelopment insh and whome conservation and redevelopment of the downstream areas. Adverse environmental impacts will include removal of 18,550 acres of land from private ownership, inundation of approximately 5,070 acres with attendant loss of wildlife habitats, loss of fifty miles of free flowing stream due to inundation with associated loss of stream habitats, and removal of two covered stream habitats, and removal of two covered bridges. Alternatives include flood plain zoning, evacuation of the flood plain, improved flood forecasting, flood insurance, acquisition of flood prone lands, levees, channel improvements, alternative reservoir sites and no project. Included is a Supplemental Data publication on the project and flood damages suffered by the area. (Brackins-W73-02269

RIVER ROUGE FLOOD CONTROL PROJECT, WAYNE COUNTY, MICHIGAN (FINAL EN VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Detroit, Mich. For primary bibliographic entry see Field 04A. W73-02270

THE TECHNICAL ASPECTS OF GRAVEL WELL CONSTRUCTION, Johnson (Edward E.), Inc., St. Paul, Minn.

Journal of the New England Water Works Association, Vol 77, No 2, p 155-164, June, 1963. 3

Descriptors: "Water wells, "Hydraulic design, Drawdown, Unconsolidated aquifers, Well screens, "Gravels, Permeability. Identifiers: "Gravel packing, Well design, Laminated formations.

The two types of gravel wells - naturally developed and gravel packed - are described. Emphasis, however, is placed on the design, characteristics, and thickness of the gravel envelope in the gravel packed well. Equations are given to determine approximately the amount of water that will move vertically downward to the water that will move vertically downward to the screen from the upper aquifer through the conduit of the gravel envelope. A minimum thickness of pack necessary to insure adequate coverage, and no more, is recommended. (Campbell-NWWA) W73-02393

HYDRAULIC PROPERTIES OF PERFORATED WELL CASINGS, California Univ., Davis.

For primary bibliographic entry see Field 08B. W73-02395

WELL GROUTING AND WELL PROTECTION. Layne and Bowler, Inc., Memphis, Tenn. For primary bibliographic entry see Field 08F. W73-02408

RELATION OF SCREEN DESIGN TO THE DESIGN OF MECHANICALLY EFFICIENT

Smith (Robert C.) and Associates, Columbus, Ohio. For primary bibliographic entry see Field 08B. W73-02410

PROCEDURES FOR INSTALLING WELL SCREENS.

Johnson Drillers Journal, Vol 40, No 2, p 1-5, March-April, 1968. 5 fig.

Descriptors: *Water wells, *Well screens, *Installation, Drilling, Rotary drilling, Well casings, Con-struction, *Construction equipment. Identifiers: *Self-sealing packers, *Washing down, Well development, Telescoping casing.

Procedures for installing well screens are shown to vary with the design of the well and with the method used in drilling the well. Various standard methods of screen installation are explored. It is demonstrated that a different method of installatemoistates that a different inetation of instanta-tion from that originally planned may become necessary because of problems encountered in the drilling operation. Methods of installing screens in rotary-drilled wells are explained in some detail. (Campbell-NWWA) W73-02415

PLACE GRAVEL PACK PROPERLY FOR BEST

For primary bibliographic entry see Field 08B. W73-02416

NEWINGTON GENERATING STATION UNIT NO. 1, NEWINGTON, NEW HAMPSHIRE (DRAFT ENVIRONMENTAL IMPACT STATE-

MENT). Corps of Engineers, Waltham, Mass. New Enary bibliographic entry see Field 08C. W73-02514

Field 08—ENGINEERING WORKS

Group 8A-Structures

NIANGUA HYDRO PROJECT (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Federal Power Commission, Washington, D.C. Bureau of Power. For primary bibliographic entry see Field 08C. W73-02515

SAINT CATHERINE SOUND, MARYLAND (MAINTENANCE DREDGING) (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Baltimore, Md. For primary bibliographic entry see Field 04A. W73-02516

MIAMI HARBOR, FLORIDA, NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATE-MENT).

Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as EIS-FL-72-4560-F, \$4.25 in paper copy, \$0.95 in microfiche. May 31, 1972. 40 p, 2 photo, 1

Descriptors: *Environmental effects, *Channel improvements, *Dredging, *Spoil banks, *Florida, Excavation, Disposal, Turbidity, Ships, Navigation, Benthic fauna, Invertebrates, Spoil banks, Harborx.

Identifiers: *Environmental Impact Statements, *Miami Harbor (Fla).

This project is the deepening of the existing 30-foot bar channel to 38 feet and widening the chan-nel in Miami Harbor, Miami, Florida for commernel in Miami Harbor, Miami, Florida for commer-cial navigation. A six mile reach of the channel will be affected. About 5,000,000 cubic yards of material will be dredged from the channel and placed in two upland dike areas and three open-water disposal areas. Adverse environmental ef-fects include temporary turbidity, destruction of benthic invertebrates in bottom sediments and covering of those in non-water disposal areas. Alcovering of those in open-water disposal areas. Al-ternative channel depths were considered but it was decided that the project would best serve the was uccured that the project would best serve the needs of present and prospective deep-draft shipping at Miami Harbor. Comments of in-terested agencies were responded to in the report. (Nielsen-Florida) W73-02517

BALTIMORE HARBOR OUTER CROSSING (PATAPSCO RIVER BRIDGE) BALTIMORE, MARYLAND (FINAL ENVIRONMENTAL IM-PACT STATEMENT). Coast Guard, Washington, D.C.

Available from the National Technical Informa-tion Service as EIS-MO-72-4496-F, \$0.50 in paper copy, \$0.95 in microfiche. May 18, 1972. 157 p, 20 fig, 5 map, 24 tab, 14 append.

Descriptors: *Environmental effects, *Maryland, *Bridge construction, Engineering structures, Bridges, Concrete structures, Piers, Civil en-Bridges, Concrete structures, Fiers, Civil en-gineering, Dredging, Excavation, Foundations, Reinforced concrete, Road construction, Harbors, Transportation, Highway effects, Embankments, Highways, Access routes, Public lands. Identifiers: *Environmental Impact Statements, *Baltimore (Md).

The proposed project involves the construction of The proposed project involves the construction of a high level fixed bridge across the Patapsco River from Hawkins Point, Baltimore City to Sollers Point, Baltimore County, Maryland. The reinforced bridge will provide four lanes of traffic with a 28-foot roadway in each direction. The 1200-foot main span will accommodate a 1,000-foot-wide shipping channel having a depth of 50 feet and a vertical clearance of 185 feet above mean high water. The project will benefit the Baltimore area by relieving the congestion now suffered by the four-lane harbor tunnel and other major arteries. 80,000 cubic yards of material will be dredged from the river and disposed on upland and adjoining approach areas. 7.6 acres of Fort Armistead, an historic site on the western approach, will be used for highway construction purposes. Air quality in the vicinity of the bridge will not be noticably affected by the increased vehicular emissions. The river's water turbidity will be increased during dredging operations. The bridge's construction will have no known impact on wildlife and waterfowl habitats. The alternative of an additional tunnel is not considered as feasible as the fixed bridge. (Beardsley-Florida)

NEWHALL, SAUGUS AND VICINITY, LOS AN-NEWHALL, SAUGUS ANTA CLARA RIVER AND TRIBUTARIES, CALIFORNIA (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Los Angeles, Calif.

Available from the National Technical Informa-tion Service as PB-208 961-D, \$3.00 in paper copy, \$0.95 in microfiche. April 1972. 66 p, 3 fig, 3 map,

Descriptors: *California, *Channel improvement, *Concrete-lined canals, *Environmental effects, Flood protection, Basins, Channels, Channeling, Canals, Drains, Floodways, Levees, Recreation facilities, Flood control, Flood plains, Environmental effects, Streamflow, Aesthetics, Vegetation effects, Wildlife habitats, Recharge. Identifiers: *Environmental Impact Statements, *Santa Clara River (Calif).

The proposed project in the Newhall-Saugus area of Los Angeles County, California involves construction of three debris basins; construction of concrete lined, earth bottom channels and levees along 28.5 miles of stream; construction of three highway bridges; and flood plain management. The project will provide flood protection to the rapidly developing urban area and will permit orderly development of the flood plain. The project will reduce the hazard to life from large floods; will reduce the menace of epidemics caused by flood damage to sewer and water systems; and will prevent interruptions to normal community activities, transportation and facilities. Recreation facilities will be developed to provide for hiking, bicycling and equestrian trails along the access and maintenance roads. Adverse environmental effects include: (1) redistribution of recharge, (2) loss of streambed infiltration, (3) loss of natural concrete lined, earth bottom channels and levees loss of streambed infiltration, (3) loss of natural vegetation along the streambanks, and (4) loss of approximately 950 acres of wildlife habitat for proapproximately 220 acres of wildlife habitat for project right-of-way. Alternatives are: (1) no action, (2) non-structural measures, and (3) various alternative structural measures. (Wheeler-Florida) W73-02521

CURRY CREEK RESERVOIR, NORTH OCONEE RIVER, GEORGIA (DRAFT EN-VIRONMENTAL IMPACT STATEMENT). Army Engineer District, Savannah, Ga.

Available from the National Technical Information Service as EIS-GA-72-4577-D, \$3.00 in paper copy, \$0.95 in microfiche. May 31, 1972. 5 p.

Descriptors: *Environmental effects, *Georgia, *Dam construction, *Reservoir construction, Dams, Flood control, Water supply, Municipal water, Industrial water, Reservoir storage, Water storage, Flood damage, Groundwater resources, Recreation, Forests, Non-structural alternatives, Multiple-purpose reservoirs, Water supply development, Flood protection.
Identifiers: *Environmental Impact Statements, *North Oconee River (Ga).

The project consists of a dam and reservoir on the Oconee River about 12 miles upstream of Athens, Georgia. The project would stimulate economic

expansion through water-related needs including water supply, flood control, recreational opportunities and area redevelopment. Flooding of Athens would be virtually eliminated by the project. Reservoir storage of water supply would meet the needs of area communities for the next 70 years. Also included in the project are eleven downstream recreation and fishing areas. The major adverse environmental effect is the inundation of about 5,720 acres of mixed hardwoods and pines interspersed with agricultural lands. Alternatives included flood plain zoning, flood proofing, evacuation, alternative site locations, a system of small upstream reservoirs and development of groundwater sources. (Nielsen-Florida) W73-02523

8B. Hydraulics

SOIL EROSION AND CHANNEL PROCESSES. NO. 2. (EROZIYA POCHY I RUSLOVYYE PROTSESSY, VYPUSK 2.). Moscow State Univ. (USSR). For primary bibliographic entry see Field 02J. W73-02062

A DICTIONARY OF HYDROGEOLOGY AND ENGINEERING GEOLOGY (SLOVAR' PO GIDROGEOLOGII I INZHENERNOY

GEOLOGII), All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR). For primary bibliographic entry see Field 10A. W73-02064

JUDGING PROPER GRAVEL-PACK THICKNESS.

Johnson National Drillers' Journal, Vol 27, No 2, p 1-4, Mar-Apr. 1955. 4 ref.

Descriptors: Permeability, *Well screens, *Gravels, Grading, Uniformity coefficient, *Gravels, Michigan. Identifiers: *Gravel packing, Effective diameter, *Sand control, Screen slot design, *Well develop-

General aspects of well development of gravelpack operation and screen installation are discussed. Gravel-pack thickness is studied for discussed. Gravel-pack thickness is studied for deterministion of optimum thickness under specific conditions. The function of the gravel pack, permeability ratio, and case histories are explored. In some areas, little was gained by increasing the diameter of the gravel pack. Often, increasing the length of the screen proved far more effective.
(Campbell-NWWA)
W73-02108

DEVELOPMENT WORK IS ESSENTIAL.

Johnson National Drillers' Journal, Vol 29, No 6, p 102, Nov-Dec. 1957.

Descriptors: *Well screens, Gravels, *Water wells, *Permeability, *Unconsolidated aquifers, Grading. Identifiers: *Well development, Screen slot design, *Developed zone, Surging, Compressed air, Backwashing, *Fines.

Water development and usage, well design needed, methods of development, improvement of permeability and porosity of water-bearing sand for some distance around the well screen from development operations are discussed. Methods of development include: the surge plunger, compressed air, backwashing with water (including bailing), and air lift pumping. (See also W73-02110) (Campbell-NWWA)

DEVELOPM hnson Nat 1-3. Jan-Feb

Descriptors: drilling, *Dri Identifiers: *Well deve cake, Form

The general effect on optare describe various dev removal, as removal, as of a well, phosphate o with prope reverse-circ well as bedr W73-02109) W73-02110

THE CORI BAY STUD Army Engin For primary W73-02149

TENTATIV SUSPENSIO Groningen Geological I For primary W73-02156 SEDIMENT

GORGE-TY Windsor U

ing. For primary W73-02179 NATIONAL REGION. Corps of I

Available f paper copy gust 1971. 1

Descriptors *Coasts, *tions, Da Federal go Coastal st cover, Env Recreation Estuaries shoreline s

In 1968, the praisal of needs. Thi North Atl located in Carolina-V border. Th seacoast of Bay, Delay bays landy sion is lik been broke one contai photograpi placed on

DEVELOPMENT WORK IS ESSENTIAL.

Johnson National Drillers' Journal, Vol 30, No 1, p 1-3, Jan-Feb. 1958.

Descriptors: *Water wells, Drilling, Rotary drilling, *Drilling fluids, *Gels, Turbidity, Gravels. Identifiers: Reverse-circulation rotary drilling, *Well development, Cable tool drilling, *Mud cake, Formation damage, *Sand control, Con-solidated aquifers, Polyphosphates.

The general aspects of well development and its effect on optimum production and screen selection are described. Various geologic conditions require various development procedures. Drilling fluid removal, as an important step in the development of a well, is emphasized. Removal of mud by a well, is emphasized. Removal of mud by phosphate dispersing agents is discussed, along with proper techniques for development of reverse-circulation and cable-tool drilled wells, as well as bedrock and gravel-packed wells. (See also W73-02109) (Campbell-NWWA)

THE CORPS OF ENGINEERS CHESAPEAKE BAY STUDY, Army Engineer District, Baltimore, Md.

rimary bibliographic entry see Field 02L.

TENTATIVE DATA ON FLOW RESISTANCE IN SUSPENSION CURRENTS, Groningen Rijksuniversiteit (Netherlands).

SUSPENSION

Geological Rijksuniversiteit (Netnema Geological Inst.
For primary bibliographic entry see Field 02J.

W73-02156

SEDIMENTATION CHARACTERISTICS OF GORGE-TYPE RESERVOIRS, Windsor Univ. (Ontario). Dept. of Civil Engineer-

For primary bibliographic entry see Field 02J. W73-02179

NATIONAL SHORELINE STUDY, REGIONAL INVENTORY REPORT, NORTH ATLANTIC

Corps of Engineers, New York. North Atlantic

Available from NTIS, Springfield, Va 22151 Vol 1 - AD-730 915; Vol 2 - AD-730 916 Price each \$3.00 paper copy; 95 cents microfiche. Two Vols, Au-gust 1971. 120 p, 71 plate, 4 tab, 81 ref.

Descriptors: *Shore protection, *Beach erosion, *Coasts, *Northeast U.S., *Census, Investigations, Data collections, Planning, Projects, Federal government, Shores, Coastal engineering, Coastal structures, Storms, Tides, Shoreline cover, Environmental effects, Land development, Recreation, Shoals, Berms, Atlantic Ocean, Bays,

Retreation, Shoas, Berns, Atlantic Ocean, Bays, Estuaries, Navigation. Identifiers: *North Atlantic Region, *National shoreline study, Regional inventory.

In 1968, the 90th Congress authorized National apin 1905, the 90th congress authorized National appraisal of shore erosion and shore protection needs. This report—the regional inventory for the North Atlantic Region (Volumes I and II)—includes information pertaining to the shorelines located in the ten states between the North located in the ten states between the Carolina-Virginia state line and the Canadian border. The study area mainly covers the outer seacoast of the region and includes shores of bays and estuaries such as Chesapeake Bay, Delaware Bay, Delaware River entrance and the large inner bays landward of the barrier beaches where erosion is likely to be a problem. Information has been broken down into 33 coastal reaches. Volume one contains the text and Volume two contains photographs and plates. Particular emphasis is placed on the physical descriptions and shore

histories of the coastlines in the region. (Woodard-USGS) W73-02186

A UNIFIED VIEW OF THE LAW OF THE WALL USING MIXING-LENGTH THEORY, Iowa Univ., Iowa City. Inst. of Hydraulic Research. V. C. Patel. April 1972. 35 p, 11 fig, 2 tab, 31 ref.

Descriptors: *Turbulent flow, *Engineering struc-tures, *Model studies, Pipe flow, Channel flow, Turbulent boundary layers, Equations, Velocity, Stress, Reynolds number, Friction, Hydraulics, Fluid mechanics.

Identifiers: Law of the wall, *Mixing-length

If the mixing-length formula is regarded simply as a relationship between the velocity and the stress distributions in the wall region of a turbulent flow, then a ruly universal distribution of mixing length is sufficient to describe the experimentally ob-served departures of the velocity distribution from the usual law of the wall as a result of severe presthe usual law of the wall as a result of severe pres-sure gradients and transverse surface curvature. Comparisons were made with a wide variety of ex-perimental data to demonstrate the general validity of the mixing-length model in describing the flow close to a smooth wall. An extension of the relaminarization criterion of Patel and Head, and some experimental evidence, suggest that the some experimental evidence, suggest that the thick axisymmetric boundary layer on a slender cylinder placed axially in a uniform stream cannot be maintained in a fully turbulent state for values of the Reynolds number, based on friction velocity and cylinder radius, below a certain critical value. (Woodard-USGS) W73-02306

ROTARY DRILLING AND CORING IN PER-MAFROST: PART III, DEEP CORE DRILLING, CORE ANALYSIS AND BORE HOLE THER-MOMETRY AT CAPE THOMPSON, ALASKA, Cold Regions Research and Engineering Lab., Hanover, N.H.

G. R. Lange, and T. K. Smith. Technical Report 95, III, September 1972. 24 p, 14 fig, 4 tab, 10 ref.

Descriptors: *Permafrost, *Core drilling, *Physi-Descriptors: "Fermatrost, "Core criming, "Physi-cal properties, "Moisture content, "Alaska, Sampling, Methodology, Rotary drilling, Frozen ground, Rocks, Drilling fluids, Cores, Laboratory tests, Data collections, Temperature, Investiga-tions, Engineering structures."

Two holes were drilled and cored to depths of 1000 ft and 1200 ft in the frozen mudstone of the Tiglukpuk formation at Cape Thompson, Alaska. Per-mafrost extends to a depth of approximately 1000 ft. The hole walls were stabilized, even in zones of very weak rock, by the use of refrigerated diesel fuel (-SC) as a drilling fluid, and frozen cores of good quality were taken with little difficulty. A thermistor cable was inserted in one of the holes and ground temperatures were measured to 1000 ft with a high order of accuracy and stability. Data required to predict accurate equilibrium temperares were available one month following installation. The frozen cores were shipped to refrigerated laboratories where special methods of testing were developed for determination of some of their physical properties in the naturally frozen state.

The total liquid contents ranged from 0.5% to 4.4% and water contents from 0.2% to 2.4%. It is inferred that water content determinations as nor-mally carried out in the laboratory often do not indicate the original water content of the rock or soil samples obtained by core drilling with a liquid. (Woodard-USGS) W73-02312

HAWAII REGIONAL INVENTORY OF THE NA-TIONAL SHORELINE STUDY. Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Engineer Div.

Available from NTIS, Springield, Va 22151 as AD730-769; Price \$3.00 paper copy; 95 cents microfiche. National Shoreline Study Report, Au-gust 1971. 110 p., 42 fig, 39 plate, 28 tab.

Descriptors: *Beach erosion, *Shore protection, *Census, *Hawaii, Investigations, Reviews, Data collections, Planning, Projects, Federal government, Shores, Coastal engineering, Storms, Tides, Tsunamis, Ocean waves, Land development, Recreation, Environmental effects, Shoreline cover, Shoals, Navigation.

Identifiers: *National shoreline study, Regional investors.

In 1968, the 90th Congress authorized National apin 1906, the 90th congress authorized valuonal ap-praisal of shore erosion and shore protection needs. Results are presented of an inventory of the shoreline of 6 of the 8 principal islands of the State of Hawaii. The islands of Kahoolawe and Niihau of Hawaii. The islands of Kahoolawe and Nilhau are excluded because their shorelines are not legally accessible to the general public. The north shores are subjected to extremely high surf from particularly severe storm conditions. Damages are primarily caused by flooding, undermining, and direct wave attacks on beachfront properties and are most evident along well developed coasts. During the extreme high surf of December 1969, private property along Oahu's north shore sustained damages of about one million dollars. A suspecseted land management alternative for the sustained damages of about one million dollars. A suggested land management alternative for the Mokuleia, Kawailoa, Sunset, Waialee, and Kawela beaches along Oahu's north shore is a restrictive building code to require open type construction for the ground floor levels of beachfront properties. (Woodard-USGS) W73-02321

A NOMOGRAPH BASED ON KINEMATIC WAVE THEORY FOR DETERMINING TIME OF CONCENTRATION FOR OVERLAND FLOW, Maryland Univ., College Park. Dept. of Civil En-

Available from NTIS, Springfield, Va 22151-PB-208 315; Price \$3.00 paper copy; 95 cents microfiche. Maryland University Department of Civil Engineering Research Report No 44, December 1971. 55 p. 18 fig., 33 ref.

Descriptors: "Graphical analysis, "Overland flow, "Engineering structures, "Culverts, "Road construction, Maryland, Peak discharge, Design Griteria, Mathematical studies, Analytical techniques, Rainfall-runoff relationships, Runoff forecasting, Graphical methods, Kinetics.

Identifiers: "Nomograph, "Kinematic wave theory.

One phase of the Maryland Highway Drainage Study concentrated on an effort to develop an im-proved nomograph for determining the time of concentration for overland flow. The determination of the time of concentration is a critical step in the computation of peak flows which control the the computation of peak flows which control the selection of pipe size of opening in highway culverts. The kinematic wave theory was used to develop a nomograph which gives very good estimates of the times of concentration for overland flow on turf and paved surfaces. The nomograph is consistent with the latest concepts of fluid mechanics and considers all parameters that have the former inconstitution of the whole the former inconstitution and the property of the peak former than the computation of the peak former than been found important in overland flow when the product of the rainfall intensity and the length of the slope is in excess of 500. Most storms of interest to designers of highway culverts will be in excess of this intensity-length product. (Woodard-USGS) W73-02322

Field 08-ENGINEERING WORKS

Group 8B-Hydraulics

AN EXPERIMENTAL STUDY OF WIND-GENERATED WAVES WITH AND WITHOUT PRESSURE GRADIENT,

Connecticut Univ., Storrs.
For primary bibliographic entry see Field 02E. W73-02346

WATER WELL HYDRAULICS, Universal Oil Products, St. Paul, Minn. Johnson

Div. G. F. Briggs, J. L. Mogg, and H. O. Williams. Industrial Water Engineering, Vol 4, No 6, p 24-

Descriptors: *Water wells, Drawdown, *Ground-water movement, Transmissivity, Specific capacity, Hydraulic gradient, Storage coefficient, Hydraulics. Hydraulics. Identifiers: *Well hydraulics, Pump tests, Cones

The concepts of ground water movement as explained by Darcy's law are expanded in reviewing the principles involved in tapping the ground water resource. The nature of converging flow and cones of depression are studied; terms used in ground water hydraulics are defined. Concepts of ground water hydraulics are defined. Concepts of ground the flow and confident proposeties are illustrated. water now and aquifer properties are illustrated graphically. The relation of well size and draw-down to yield are explained. A brief description of well tests is given. (Campbell-NWW A0

THE ELECTRIC LOG: GEOPHYSICS' CONTRIBUTION TO GROUND WATER PROSPECT-ING AND EVALUATION, For primary bibliographic entry see Field 04B. W73-02373

NOTES ON THE EARLY HISTORY OF WATER-

-WELL DRILLING IN THE UNITED STATES, C. W. Carlston. Economic Geology, Vol 38, No 2, p 119-136, March, 1943. 4 fig, 30 ref.

Descriptors: *Water wells, Drilling, *History, Patents, Artesian wells, Well casings, *Drilling

equipment. Identifiers: Cable-tool drilling, Salt wells, Auger horing.

The standard cable-tool drilling rig was invented and developed in drilling salt wells in the West Virginia-Ohio-Pennsylvania region during the twenty years following the successful completion of the first drilled well in 1808 by the Ruffner brothers at the Creat Purple of the Control of the State C the Great Buffalo Lick near Charleston, West Virthe Great Buffalo Lick near Charleston, West Virginia. Some time previous to 1823, Lev Disbrow studied the drilling methods used in the western salt industry and cane east to become the first professional water well driller in the states north of the Potomac River. Possibly the first artesian water well in the United States was constructed in 1820 in Charleston, South Carolina, by sinking an iron pipe through a clay bed. Auger boring for artesian water appears to have been first used in Charleston, South Carolina, in 1823. Between 1821 and 1833 auger boring of artesian wells began in the Black Belt of Alabama and possibly in Mississippi. The process of jetting wells, invented in 1884, mark nett of Atabama and possibly in Mississippi. The process of jetting wells, invented in 1884, became the chief method of sinking artesian wells in the Atlantic and Gulf Coastal Plain by the end of the century. (Campbell-NWWA)

W73-02376

COMPOSITIONAL LOGGING OF ATR--DRILLED WELLS. Gulf Research and Development Co., Pittsburgh,

Pa. W. F. Hooper and J. W. Earley. Bulletin of the American Association of Petroleum Geologists, Vol 45, No 11, p 1870-1883, November, 1961. 6 fig, 1 tab, 14 ref.

Descriptors: Sampling, *Lithologic logs, *X-Ray analysis, Natural gas, Subsurface investigations, *Pennsylvania, *Geologic Investigations, *Pennsylvania, *Geologic Investigations,
Mineralogy.
Identifiers: *Compositional logging, Geologic

The mineralogical composition of representative samples of air-drilled cuttings taken at 10-foot intervals from two wells in the Punxsutawney-Driftwood gas field of central Pennsylvania has been determined by routine methods of X-ray analysis. District mineralogical zones correspond closely with formations and formational contacts. Although the wells are 18 miles apart, correlations can be made. Compositional logs of air-drilled holes are easily obtained and can be used for interpreting subsurface geology in the same fashion nuces are easily obtained and can be used for in-terpreting subsurface geology in the same fashion as conventional electric logs. In addition, the presence, absence, and relative abundance of minerals yield information on the geological histo-ry of the area. (Campbell-NWWA)

HYDRAULICS OF WELLS, Baghdad Univ. (Iraq). Coll. of Engineering. M. S. Hantush.
In: Advances in Hydroscience, Academic Press,
New York, N.Y. Vol 1, p 282-432, 1964.

Descriptors: Well spacing, *Water wells, Darcy's law, Drawdown, Artesian aquifers, *Groundwater movement, Boundaries (surfaces), *Aquifer

Identifiers: *Well hydraulics, Pump tests, Collector wells, Nonsteady state.

An overview of the entire field of well hydraulics is presented. Topics include Basic Principles and Fundamental Equations, Integral Transforms and Mathematical Functions, Flow to Artesian Wells, Flow to Water-Table Wells, Flow to Collector Wells, Tout the Principle of Tasts. Wells, and Pumping Tests. Boundaries are discussed in some detail. (Campbell-NWWA) W73-02378

CARRYING CAPACITY OF DRILLING MUDS, Humble Oil and Refining Co., Houston, Tex. C. E. Williams, Jr., and G. H. Bruce. Petroleum Transactions, AIME, Vol 192, p 111-120, 1951. 12 fig. 3 tab, 14 ref.

Descriptors: *Drilling fluids, Rotary drilling, Turbulence, Viscosity, Gels, *Carrying capacity, *On-site investigations. Identifiers: *Cuttings removal, Annular velocity, Mud weight, *Mud properties, Slip velocity.

Laboratory and field experiments were conducted to determine the minimum annular velocity necessary to remove cuttings, and to investigate the effects of properties of drilling fluids on their carrying capacities. The following conclusions were made: 1. Turbulent flow in the well annulus is most desirable from the standpoint of cutting removal. 2. Low viscosity and low gel are advantageous in removing cuttings. 3. Increase in mud weight is effective in increasing carrying capacity. 4. The carrying capacity is higher when the pipe is rotated than when it is not. 5. If turbulent flow can be maintained, an annular velocity slightly higher unan wnen it is not. 5. If turbulent flow can be maintained, an annular velocity slightly higher than the slip velocity of the largest cuttings to be transported should keep the bore hole clean. (Campbell-NWWA) W73-02379

VOLUME REQUIREMENTS FOR AIR OR GAS Phillips Petroleum Co., Houston, Tex.

R. R. Angel. Petroleum Transactions, AIME, Vol 210, p 325-330, 1957. T.P. 4679, 5 fig, 5 ref.

Descriptors: Drilling, Rotary drilling, *Drilling fluids, Optimization, Flow rates, *Circulation.

Identifiers: *Air drilling, Gas drilling, Bit cleaning, Drilling rates. *Annular velocity.

A vertical-flow equation is presented for determining volume requirements. This equation includes the effect of the solids that are transported up the annulus in the flow stream by incorporating the drilling rate as one of the parameters. The effect of drilling rate as one of the parameters. The effect of down-hole temperature on required circulation rates is also analyzed. A simple approximate method of determining volume requirements is presented. Hole cleaning difficulties are analyzed for an air drilling job where past methods indicated that excess air was being used. Sample curves of calculated bottom-hole pressures are presented for air and gas drilling in several hole sizes. (Campbell-NWWA)
W73-02381

THE WORLD'S DEEPEST CABLE TOOL WELL, New York State Natural Gas Corp. E. C. Inghram. Drilling, Vol 16, No 10, p 145, 183, August, 1955.

Descriptors: *Drilling, Logging (Recording), Electrical well logging, *Drilling equipment, New York, Oil industry, *Natural gas, Radioactive well logging, Depth, *Deep wells.

Identifiers: *Cable tool drilling, Oriskany sand, Temperature logging.

A well drilled by the cable-tool method in Chemung County, New York, penetrated to 11,145 feet, a world record for cable tool drilling methods. Details of the 'Drilling Deeper' project, and the capture including which was begun at 8371 feet, are given, inc wance was organ at 65/1 feet, are given, including costs, equipment and techniques used, problems encountered. Although natural gas was not found in commercial quantities, all other goals originally set were achieved. (Campbell-NWWA) W73-02388

EFFECT OF WELL SCREENS ON FLOW INTO

WELLS,
Missouri Univ., Columbia.
J. S. Petersen, C. Rohwer, and M. L. Albertson.
American Society of Civil Engineers Transtions, Vol 120, p 562-584, 1955. Paper No 2755.

Descriptors: "Water wells, "Well screens, "Flow around objects, "Flow measurement, Hydraulic models, Hydraulic properties, Theoretical analysis, Design criteria, Optimization, Head loss, Drainage wells.

Identifiers: Entrance velocity, "Flow theory.

The hydraulics of wells involves flow (1) in the surrounding aquifer, (2) through the well screen, and (3) inside the well is discussed. A theoretical development is presented which relates the loss of development is presented which relates the loss of head to the characteristics of the well screen. To support the theoretical development, a laboratory investigation of well screens was made. The objective was to establish criteria which could be used to aid in the selection of well screens to meet the to at an the selection of well screens to meet the varied conditions found throughout the United States. To do this, screen coefficients (permitting the use of a theoretical equation for design purpose) were determined for specific well screens. (Cambpell-NWWA) W73-02389

ELECTRICAL WELL LOGGING FUNDAMEN-Halliburton Oil Well Cementing-Co., Duncan,

Okla H. Guyod.

Well Instrument Developing Co., Houston, Texas, 1952. 164 p, 301 ref.

Descriptors: Logging (Recording), *Electrical well logging, *Resistivity, *Oil industry, Limestone, Sandstone, Saturation.

Identifiers: *Spresistance, *Mu (Oil), Reserve Micrologs.

An original prina reprint of 25 oil magazines cluded in this point resistar logging metho potentials, mic cation of sand mation of petro electrical loggin W73-02392

THE TECHN WELL CONST Johnson (Edward For primary bi W73-02393

BOUNDARY I DESIGN OF V gineering. M. M. Soliman Journal of the American Soc IR1, p 159-177

Descriptors: Well screens, consolidated rates, Flow sy Identifiers: E Well design.

theoretical A more econo by applying the of well productive of screen entrance velo pack could be the well by in cur, and decre to prevent fit top zones. (Ca W73-02394

HYDRAULIC WELL CASI California Un Y. Vaadia, an Journal of th American So IR1, January

Descriptors: screens, *! Hydraulic d aquifers. Identifiers: * ings, Punche design.

Several commune were tested f of three com found that: (than puncher casing; (2) Si fluence on the casings—large formance; ar W73-02395

Identifiers: *Spontaneous potential, *Single-point resistance, *Multiple electrode logging, Reservoirs (Oil), Reservoir lithology, Electrode spacing,

An original printing of two papers, two charts and a reprint of 25 articles which appeared in various oil magazines during the period 1944-52 are included in this book. Subjects include the single-point resistance method, multiple electrode logging methods, resistance curves, electrical potentials, micrologs and their interpretation, location of sand and carbonate reservoirs, and estimation of petroleum saturation. A bibliography on electrical logging is presented. (Campbell-NWWA) W73-02392

THE TECHNICAL ASPECTS OF GRAVEL WELL CONSTRUCTION, Johnson (Edward E.), Inc., St. Paul, Minn. For primary bibliographic entry see Field 08A. W73-02393

BOUNDARY FLOW CONSIDERATIONS IN THE DESIGN OF WELLS, Ain Shams Univ., Cairo (Egypt). Faculty of En-

gineering. M. M. Soliman.

Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 91, No IR1, p 159-177, March, 1965. Paper 4272, 10 fig,

Descriptors: "Water wells, "Hydraulic design, Well screens, Gravels, "Hydraulic properties, Un-consolidated aquifers, Hydraulic gradient, Flow rates, Flow system, "Mathematical models. Identifiers: Entrance velocity, Gravel envelope, Well design.

A theoretical treatment of entrance velocity dis A theoretical treatment of entrance velocity dis-tribution around the well and inside it is presented. A more economical well design has been proposed by applying the theory developed. The efficiency of well production may be increased by using a type of screen opening which would change the entrance velocity from radial to axial. The gravel entrance velocity from radial to axial. The gravel pack could be arranged to preserve the safety of the well by increasing its thickness in the top zone of the screen where higher entrance velocities occur, and decreasing the thickness in the lower part, to prevent fine particles from settling out of the top zones. (Campbell-NWWA) W73-02394

HYDRAULIC PROPERTIES OF PERFORATED

HYDRAULIC PROPERTIES OF PERFORATED WELL CASINGS, California Univ., Davis. Y. Vaadia, and V. H. Scott. Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 84, No IRI, January, 1958. Paper 1505, 13 p., 3 tab, 9 ref.

Descriptors: *Water wells, *Well casings, Well screens, *Hydraulic properties, *Gravels, screens, *Hydraulic properties, *Gravels, Hydraulic design, Flow rates, Unconsolidated

aquifers. Perforated well casing, Chiseled cas-ings, Punched casings, *Gravel packing, Well design.

Several commercially available perforated casings were tested for hydraulic performance. The effect of three common types of gravel envelopes on performance of the casings was investigated. It was found that: (1) Chiseled casings are less efficient than punched casings for a given short length of casing; (2) Size and shape of gravel have great incanng; (2) 512e and shape of gravel have great in-fluence on the plugging of openings in perforated casings-large, spherical grains giving the best per-formance; and (3) Chiseled casings are not plugged by gravel as much as are punched casings. (Camp-bell-NWWA) W73-02395 A NEW APPROACH FOR ESTIMATING TRANSMISSIBILITY FROM SPECIFIC CAPACITY

CAPACITY, Geological Survey, Denver, Colo. R. T. Hurr. Water Resources Research, Vol 2, No 4, p 657-663, October-December, 1966. 6 fig. 2 tab, 10 ref.

Descriptors: *Specific capacity, *Theis equation, *Transmissivity, Drawdown, Specific yield, Mathematical models, Analog models, Flow rates, Flow measurement.

Identifiers: *Transmissibility (Transmissivity),

Delayed vield.

A method of estimating transmissibility from a single-point observation by a manipulation of the Theis nonequilibrium formula is shown. Delayed Ineis nonequinforum formula is snown. Delayed yield from storage is taken into account by assuming an apparent specific yield. It is emphasized that this method provides only an estimate and must be used with caution and judgment. The error of the estimated transmissibility will be 30 to 40% of the estimated transmissionity will be 30 to 40% of the error made in assuming the apparent specific yield for u equals 10 to the negative two power and 10 to 15% for u less than 10 to the negative four power. The curves presented were used tive four power. Ine curves presented were used to construct a transmissibility map of the valley-fill aquifer in the Arkansas River valley of Colorado. The transmissibilities estimated from the type curves correlate well with transmissibilities determined from aquifer tests and estimated from test-hole logs. (Campbell-NWWA)

RELATION OF SCREEN DESIGN TO THE DESIGN OF MECHANICALLY EFFICIENT WELLS

Smith (Robert C.) and Associates, Columbus, R. C. Smith.

Journal of the American Water Works Association, Vol 55, No 5, p 609-614, May, 1963.

Descriptors: "Water wells, "Well screens, "Fric-tion, "Drawdown, "Unconsolidated aquifers, Pump testing, Glacial aquifers. Identifiers: "Mechanical efficiency, "Well losses, Well development, "Entrance velocity, Critical particle size, Open screen area.

Excessive friction of wells pumped at relatively high capacities with resulting large drawdowns is a problem explored in detail. Screen design as one of the most important factors in increasing mechanical efficiency of a water well is discussed. Critical cas existency or a water well is discussed. Critical particle size, entrance velocity, and open screen area are parameters which determine proper screen design. Entrance velocity, particularly, is the most critical design factor; examples are given. (Campbell-NWWA) W73-02410.

PUMP APPLICATION ENGINEERING, For primary bibliographic entry see Field 08C. W73-02414

PROCEDURES FOR INSTALLING WELL SCREENS.

For primary bibliographic entry see Field 08A. W73-02415

PLACE GRAVEL PACK PROPERLY FOR BEST RESULTS.

Johnson Drillers Journal, Vol 40, No 6, p 1-4, 13, November-December, 1968. 6 fig.

Descriptors: "Water wells, "Gravels, Drilling, "Hydraulic design, Grading, Well screens. Identifiers: "Gravel packing, "Well development, "Reverse-circulation, Fluid velocity, Bridging,

Proper selection of the pack material and place-ment of the material around the well screen by a reliable procedure are the two most important facreliable procedure are the two most important factors in successful gravel packing of water wells. Avoidance of bridging of the gravel in the annular space, as well as proper development after installation are also shown to be important, and techniques for accomplishing both are explained as is avoidance of sand pumping, the primary cause of pump wear. (Campbell-NWWA) W73-02416

JET CLEANING OF WATER WELLS DESCRIBED.

Johnson National Drillers' Journal, Vol 30, No 6, p 1-3. Nov.-Dec. 1958. 3 fig, 3 tab.

Descriptors: *Weil screens, Water wells, *Jets, Unconsolidated aquifers, *Chlorination. Identifiers: *Weil development, Chemical treatments, Polyphosphates.

A technique of horizontal jetting used in conjuction with various types of chemical treatment is described. The procedure consists of operating a horizontal water jet inside the well in such a way that a high-velocity stream of water shoots out through the screen openings. The jet thus projects its force through the slot openings of the screen and actually moves the sand and gavel particles of the formation around the screen. (Campbell-NDWA) W73-02417

READERS COMMENT ON STEP DRAWDOWN

TEST, Hunting Technical Services Ltd., Lahore nary bibliographic entry see Field 08G. For primar W73-02419

FILTRATE INVASION IN HIGHLY PERMEA-BLE SANDS, H. G. Doll.

The Petroleum Engineer, Vol 27, No 1, p B53-B66, January 1955. 14 fig.

Descriptors: *Drilling fluids, *Sand aquifers, Re-Descriptors: Draining induces, Santi aquees, Resistivity, Filtration, Permeability, Logging (Recording), *Analog models. Identifiers: *Mud invasion, Formation damage, *Fluid ascension, Microlog, S.P. log.

Salt-water bearing sands of high permeability drilled with fresh-water mud show on resistivity logs that the invasion is deep in the upper part of the sand section and shallow in the lower part. This observation is explained by the upward migration of the filtrate due to the difference in density between mud filtrate and connate water. (Campbell-NWWA) (Campbell-W73-02422

WATER UTILITY DISTRIBUTION LOSS, For primary bibliographic entry see Field 05G. W73-02431

DENSITY STRATIFIED, VISCOUS FLOW PAST

A FLAT PLATE, Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean En-

J. A. Schetz, S. Favin, and L. W. Ehrlich.
American Institute of Aeronautics and Astronautics Paper No 72-646 presented at AIAA 5th Fluid and Plasma Dynamics Conference, Boston, Massachusetts, June 26-28, 1972. 9 p. OWRR B-041-VA (1).

Descriptors: *Flow around objects, *Reynolds number, *Viscous flow, Mathematical studies, *Boundary layers, *Stratification.

Field 08-ENGINEERING WORKS

Group 8B-Hydraulics

Analytical approximations of the stratified, laminar flow past a flat plate are considered. Perturbation solutions are obtained for the flow on the plate and in the far wake with a boundary-layer type of approximation and for the whole flow field with a low Reynolds' number approximation. The boundary layer approximates solutions show that the wall shear on the plate is increased and that the rate of decay of the velocity defect in the wake is markedly increased. In the low Reynolds' number regime, the effects of the stratification are much larger ahead of and behind the plate than on the plate itself. (Johnson-Virginia)

8C. Hydraulic Machinery

RESEARCHERS SEEK WAYS TO LOWER COSTS OF UNDERGROUND TRANSMISSION SYSTEMS, S. M. Lewis.

Transmission and Distribution, Vol 24, No 5, p 43-51, 114, May 1972. 9 fig, 4 tab.

Descriptors: *Transmission Descriptors: "Transmission (Electrical), 'Reviews, Cryogenics, Costs, Transmission lines, Electric current, Electric cables, Electrical insula-tion, Electrical design, Electric power. Identifiers: "Pipe-type cables, "Gas-insulated ca-bles, "Cryogenic cables, "Underground transmis-sion lines, Underground cables, Buried cables, Dielectrics.

Significant advances in underground transmission resulting from concerted research efforts of the past decade are reviewed. Under the Electric Research Council (ERC) research and development program, studies have been made on: (1) gas-insulated cable systems; (2) cryogenic cables; and (3) extruded insulation cables. Manufacturers have (3) extruded insulation cables. Manufacturers have cooperated with ERC through laboratory research programs established by each company. Underground transmission is still much more expensive than equivalent overhead lines, but progress is being made in reducing costs. Development of underground cable systems capable of 2,000- to 10,000-mva carrying capacity is advancing steadily. Such systems will be needed beyond 1980 to bring electric power into heavily populated urban centers. (USBR)

centers. (U W73-02074

NEPTUNE METER COMPANY'S NEW WATER METER MANUFACTURING FACILITY.

Water and Sewage Works, Vol 119, No 8, p 52, August 1972. 2 fig.

Descriptors: *Instrumentation, Flow rates, *Mea-

Neptune Meter Co. opened a 100,000 sq. ft. plant to manufacture water meters. Completed in February, 1972, the plant generates \$1.5 million to the local area, and employs 140 persons now, with 250 estimated on completion of all facilities. Meter components and sub-assemblies are carried by roller and overhead conveyors from machining to assembly areas. Completed meters are placed in test benches where water, at various flow rates, is pumped through them to insure compliance with accuracy standards. The meters then are numbered serially and conveyed to the packaging area and shipping department. (Anderson-Texas) W73-02216

POWER, POLLUTION, AND PUBLIC POLICY, ISSUES IN ELECTRIC POWER PRODUCTION, SHORELINE RECREATION, AND AIR AND WATER POLLUTION FACING NEW ENGLAND AND THE NATION.

Massachusetts Inst. of Tech., Cambridge. Sea

Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office. For primary bibliographic entry see Field 06G. W73-02299

OFFSHORE SITING OF ELECTRIC POWER PLANTS,
Massachusetts Inst. of Tech., Cambridge. Sea
Grant Project Office.
For primary bibliographic entry see Field 06G.
W73-02301

SEISMIC BOREHOLE PLUG.

P. Bassani. U.S. Patent 3, 613, 784, October, 1971. 5 p, 2 fig, 5

Descriptors: Drilling, Drilling equipment, *Boreholes, *Patents, aquifers, Artesian heads.
Identifiers: *Sealing, *Plugs, Inventions.

A tubular inflatable bag has its lower end secured to a bottom closure cap at the lower end of an air pipe which has a lateral passage for admitting air into the bag. The upper end of the bag is secured to a top closure cap which is slidable along the pipe as the bag expands during inflation. Upward sliding of the top cap is limited by an abutment provided on the pipe above the bag, the abutment consisting of a housing which contains a valve for controlling airflow through the pipe. (Campbell-NWWA)

PUMP APPLICATION ENGINEERING, T. G. Hicks, and T. W. Edwards. McGraw-Hill, New York, N.Y., 1971, 435 p.

Descriptors: *Pumps, Mechanical equipment, *Mechanical engineering, Fluid mechanics, *Ap-plication equipment, Engineering, Installation, Ef-ficiencies, Economics, Design standards. Identifiers: Internal combustion engines.

As an updated version of Pump Selection and Application, published in 1957, this work incorporates the technological advances which have been applied to pumping equipment from 1957 to 1971. This book is divided into three basic sections: (1) Pump Classes and Types; (2) Pump Selection; and (3) Pump Applications. New data incorporated into this most recent work include: improved materials and better pump designs, superior quality-assurance techniques, increased equipment standardizations, wide application of 'twin volutes,' improved mechanical seal designs, order-of-magnitude size increases, and the general reduction of temperature limitations at both ends of the scale. (Campbell-NWWA)

NEWINGTON GENERATING STATION UNIT NO. 1, NEWINGTON, NEW HAMPSHIRE (DRAFT ENVIRONMENTAL IMPACT STATE-

Corps of Engineers, Waltham, Mass. New En-

Available from the National Technical Informa-tion Service as EIS-NH-72-4530-D, \$10.75 in paper copy, \$0.95 in microfiche. March 15, 1972. 106 p, 26 fig, 6 map, 1 photo, 23 tab, 1 chart.

Descriptors: *New Hampshire, *Environmental effects, *Electric powerplants, *Electric power production, Electric power, Electric generators, Switchyards (Electric), Cofferdams, Discharge (Water), Dredging, Turbidity, Thermal water, Plankton, Entrainment, Silting, Benthos, Benthic flora, Aquatic environment, Aquatic habitats, Thermal pollution, Water pollution sources, Water rollution effects. pollution effects. Identifiers: *Env

ponution effects.
Identifiers: *Environmental Impact Statements,
*Newington (New Hampshire).

This project involves the construction of a 400 MW oil-fired fossil fuel generating station and associated structures on the Piscataqua River near Newington, New Hampshire. Also involved are

the dredging and disposal of approximately 23,500 cubic yards of bottom sediment and construction of a Cofferdam and its subsequent removal involving approximately 9,000 cubic yards of dumped fill. The plant will provide electrical energy for the New Hampshire coastal area. Adverse environmental effects will include: the overlap of discharge waters from the Newington Station and an existing station may create a thermal blockage on migrating fish; uptake of heavy metals or other intoxicants by invertebrates in the discharge flume area; increased potential oil spillage; entrainment and entrapment of plankton organisms; temporary increase in turbidity and silitation due to dredge and fill operations; alteration of 3 acres of intertidal-subtidal habitats and destruction of benthic populations within or adjacent to discharge flume; and possible destruction of larval and anadromous fishes during passage through the cooling system. Alternatives considered include alternative methods of power generation and various mitigation measures. (Ellis-Florida) generation Florida) W73-02514

NIANGUA HYDRO PROJECT (DRAFT EN-VIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C.
Bureau of Power.

Available from the National Technical Informa-tion Service as EIS-MO-72-4719-D, \$3.00 in paper copy, \$0.95 in microfiche. June 14, 1972. 12 p, 1

Descriptors: *Hydroelectric project licensing, *Missouri, *Environmental effects, *Hydroelectric plants, Engineering structures, Powerplants, Electric powerplants, Dams, Earth dams, Rockfill dams, Gravity dams, Earthworks, Reservoirs, Spillways, Hydraulic structures, Tunnels, Hydroelectric power, Concrete structures. Identifiers: *Environmental Impact Statements, *Camden County (Mo), Licenses.

This statement accompanies a request for a license for a power project on the Niangua River in Cam-den County, Missouri, which has been in opera-tion since 1930 and consists of an 878-foot dam consisting of a concrete gravity overflow section, a rock and earth-fill section, and a rock-filled crib a rock and eart-in section, and a rock-ined crib section; a reservoir about 2 1/4 miles long with an area of about 360 acres and gross capacity of 2,650 acre-feet; a concrete lined tunnel about 830 feet area or about you area and gross capacity of 2,000 acre-feet; a concrete lined tunnel about 830 feet long extending to a surge chamber section at the powerhouse; a powerhouse containing two 1,500 kilowatt units; an outdoor substation; appurtenant facilities; and access areas for public fishing and boating. The annual power production of the project is about 10,000,000 kilowatt hours. The project has increased the fish resources of the area, and the continued operation is not expected to change existing environmental conditions. Alternatives are to grant the application for license or to deny the application, remove the project facilities and restore the area to its original condition. Also included is a statement of Pederal Power Commission policies to implement procedures for compliance with the National Environmental Policy Act of 1969. (Wheeler-Florida)

NEWHALEM CREEK PROJECT, WASHING-TON (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Federal Power Commission, Washington, D.C.

Bureau of Power.

Available from the National Technical Informa-tion Service as PB-207 234-D, \$3.00 in paper copy, \$0.95 in microfiche. February 4, 1972. 23 p, 1 map.

Descriptors: *Washington, *Environmental effects, *Hydroelectric plants, *Diversion dams, Hydroelectric power, Electric power production,

Electric powersion flow, Surface Hydroelectric Identifiers: Newhalem C

The proposed cated on N Skagit River The project's c.f.s. to 65 c.f containing a 2 the flows of t sion dam. Th creek is unkn not significa resources. Ti footbridge ac tion of a oneaccess facilit mental effect plant and rep source is no Florida) W73-02522

8D. Soil 1

RIRIE DAM IDAHO (DR STATEMEN Army Engine

Available fro

tion Service copy, \$0.95 i fig, 2 map, 7 *Rockfill dar protection, Channels, Bypasses, 1

Recreation, Aquatic envi Economic in Identifiers: *Willow Cre

This flood c tion of a rock onfluence v 7.8 mile long Willow Cree create a lak 1 560 acres s The project' flooding in a will provide tion use. Th opportunitie constrained resulting fro clude: elimin stream; wate inflow of m channel and and associat begins. Alte construction alternatives, and other da Electric powerplants, Discharge (Water), Generators, Diversion structures, Engineering structures, Aquatic habitats, Trout, Streamflow, Alteration of flow, Surface waters, Permits, Fish conservation, Hydroelectric project licensing. Identifiers: *Environmental Impact Statements, *Newhalem Creek (Wash).

The proposed action is an application for a license to continue operation of a hydroelectric plant located on Newhalem Creek, a tributary of the Skagit River in Whatcom County, Washington. The project's 10-foot diversion dam diverts 20 c.f.s. to 65 c.f.s. through a tunnel to a powerhouse containing a 2,500 KW generating unit. The major environmental impact of the plant is the change in the flows of the Newhalem Creek from the diversion dam. The extent of damage to trout in the creek is unknown. The operation of the plant does not significantly affect any other wildlife resources. The only proposed construction is a footbridge across the Skagit River and the renovation of a one-fourth mile footpath. Neither of these access facilities will have any adverse environ-mental effects. The alternative of abandoning the plant and replacing the loss of power from another source is not considered feasible. (Beardsley-Florida) W73-02522

8D. Soil Mechanics

RIRIE DAM AND LAKE, WILLOW CREEK, IDAHO (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Walla Walla, Wash.

Available from the National Technical Information Service as EIS-ID-72-4710-D, \$8.00 in paper copy, \$0.95 in microfiche. May 15, 1972. 106 p, 6 fig, 2 map, 7 photo, 3 tab.

Descriptors: *Idaho, *Environmental effects, *Rockfill dams, *Multiple-purpose projects, Flood protection, Reservoirs, Dams, Flood control, Channels, Diversion structures, Floodways, Bypasses, Flood routing, Canal construction, Recreation, Wildlife habitats, Water quality, Aquatic environment, Irrigation, Parization water, Economic impact, Water level fluctuations, Water

Identifiers: *Environmental Impact Statements, *Willow Creek (Idaho), *Ririe Dam and Lake.

This flood control project involves the construction of a rockfill dam on Willow Creek in Idaho approximately 29 miles upstream from the creek confluence with Snake River and construction of a 7.8 mile long floodway channel which will connect Willow Creek with the Snake River. The dam will create a lake with a maximum surface area of 1,560 acres and a storage capacity of 100,000-feet.
The project's major impact will be the reduction of ding in areas downstream of the dam. The lake will provide additional amounts of water for irrigation use. The lake will also provide recreational opportunities; however, recreational use will be constrained by seasonal water level fluctuations resulting from irrigation use. Adverse effects include: elimination of 12 miles of natural flowing stream; water quality impairment due to the large inflow of nutrients from uplands; conversion of farming and grazing land and wildlife habitat to channel and lake use; and disruption of the stream and associated biota when lake clearing and filling begins. Alternatives considered include foregoing construction, floodplain management, structural alternatives, alternate floodway channel routes and other dam sites. (Ellis-Florida) W73-01988

LOST CREEK LAKE PROJECT, ROGUE RIVER, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Portland, Oreg.

Available from the National Technical Informa-tion Service as EIS-OR-72-4666-F, \$12.00 in paper copy, \$0.95 in microfiche. June 7, 1972. 189 p, 2 fig, 5 photo, 1 tab, 3 chart.

Descriptors: *Oregon, *Environmental effects, *Reservoir construction, *Dam construction, *Multiple-purpose reservoirs, Earth dams, Water storage, Flood control, Hydraulic structures, Hydroelectric plants, Water supply, Dependable supply, Flood protection, Watershed management, Electric power production, Engineering structures, Flooding, Water conservation, Aesthetics, Water resources development, Water management (Applied) management (Applied).
Identifiers: *Environmental Impact Statements,

Rogue River (Oregon).

The proposed action consists of the construction of a 325 foot high rock and gravel fill embankment dam and related structures on the Rogue River, Jackson County, Oregon. The project will provide 315,000 acre feet of water storage for flood control and water conservation, municipal and industrial water supply, fish and wildlife enhancement, water quality control, recreation, irrigation, and power generation. Approximately 7,800 acres of land will be utilized for the construction of the overall project. Other adverse environmental impacts from the project include: flooding of 3,430 acres of the river valley behind the dam which was used for timber production and farming, the loss of an 11-mile stretch of natural stream, the loss of wildlife throughout the lake and flooded area, and adverse aesthetic conditions during periods of pool drawdown. The chief benefits of the proposed action are reduction of \$3,500,000 annual flood damage from the Rogue River, the expected construction activity in the flood plain because of reduced flood risk, the generation of 22,100 kilowatts of firm power, and the production of trout and salmon at the Cole M. Rivers Hatchery. Included are comments from interested governmental agencies. (Beardsley-Florida) W73-01989

HYDROMETEOROLOGICAL RELATIONSHIPS AND THEIR EFFECTS ON THE LEVEES OF A

SMALL ARCTIC DELTA, Louisiana State Univ., Baton Rouge. Coastal Studies Inst

J. M. McCloy. Geografiska Annaler, Vol 52A, No 3-4, p 223-241, 1970. 18 fig, 1 tab, 23 ref.

Descriptors: *Deltas, *Arctic, *Geomorphology, Permafrost, Sediment transport, Hydrogeology, Sedimentation, Alluvial channels, Flood plains, Erosion, *Canada, *Levees, *Coastal plains. Identifiers: Blow River Delta (Canada).

During a geomorphic reconnaissance of the Blow River Delta, Yukon Territory, Canada, several destructional constructional and hydrometeorological processes affecting the levee system were recorded and analyzed. In the upper deltaic plain, eolian deposition has created levee heights in excess of flood stage. In the lower deltaic plain, levee construction is augmented by log acic plain, levee construction is augmented by log ac-cumulations on the eastern levees, resulting in height differences in paired levees. Destruction of levees in the upper deltaic plain is characterized by thermoerosional caverns which subsequently col-lapse and mask the bank, thereby protecting the previously exposed levee from erosion. In the lower deltaic plain, levees are influenced by vegetative root binding during erosion. (Knapp-IISGS) W73-02041

GEOLOGY AND DAMS, VOLUME IV. All-Union designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR). For primary bibliographic entry see Field 08A. W73-02067

EVALUATION OF PROPERTIES ROCKFILL MATERIALS,

Converse, Davis and Associates, Pasadena, Calif. N. D. Marachi, C. K. Chan, and H. B. Seed. Journal of the Soil Mechanics and Foundations Division, American Society of Civil Engineers, Vol 98, No SM1, p 95-114, Jan 1972. 12 fig, 2 tab, 27 ref, 2 append.

Descriptors: *Rock fill, Forecasting, Material tests, Shear strength, Compressibility, Bibliogra-phies, Model studies, Gradation, Laboratory tests, Scale effect, Rock mechanics, Basalts, Stress-strain curves, Rock properties, Dam design, Soil

mechanics. Identifiers: Oroville Dam (California), *Grain sizes, Triaxial tests, Axial strain, *Rockfill dams, Internal friction, Rock tests.

Since materials used in a rockfill dam may be several feet in diameter, triaxial tests determined the effects of modeling the gradation curves on the materials strength and deformation characteristics. Drained triaxial tests on 3 widely different types of rockfill materials were performed on 36.0-, 12.0-, and 2.8-in-dia triaxial specimens at effective confining pressures of 30, 140, 420, and 650 psi. Some conclusions are that gradation modeling: (1) did not substantially affect the specimens; (2) did affect somewhat the angle of internal friction of the specimens but the trend was ternal friction of the specimens, but the trend was similar for all 3 materials tested; and (3) provides a useful method for predicting strength and defor-mation characteristics of field rockfill materials. properties of rockfill materials composed of well-graded and well-rounded particles are superior to uniformly graded angular materials. (USBR)

RATE OF SETTLEMENT UNDER TWO- AND THREE-DIMENSIONAL CONDITIONS,

Sydney Univ. (Australia). E. H. Davis, and H. G. Poulos. Geotechnique, Vol 22, No 1, p 95-114, Mar 1972. 23 fig, 1 tab, 35 ref, append.

Descriptors: *Settlement (Structural), *Foundations, *Consolidation, Rates, Shape, Permeability, Laboratory tests, Model tests, Pore pressure, Dif-Laboratory tests, Model tests, Pore pressure, Dif-fusion, Forecasting, Soil mechanics, Theoretical analysis, Bibliographies, Coefficients. Identifiers: Foundation models, Australia, Footings, Soil consolidation tests, Anisotropy, Pore water pressure, Three dimensional.

A series of solutions is presented for the rate of A senes of solutions is presented for the rate of settlement of circular and strip foundations on a soil layer. Although these solutions are obtained from the simple diffusion theory of consolidation rather than the more rigorous Biot theory, results are expected to be sufficiently accurate for practical use. Examined theoretically are the effects on the rate of settlement of different factors arising in the rate of settlement of different factors arising in practical problems, such as footing shape, soil anisotropy, and a sand layer overlying the clay layer. Corrections for these factors are given. Results show that for very deep soil layers and for rectangular footings where the length to width ratio is less than 5, the settlement rate depends arily on the footing area and is virtually indeprimarily on the rooting area and is virtually inde-pendent of the footing shape. Results of laboratory tests on model footings presented show good agreement between the predicted and observed rates of settlement. Such agreement is significant because actual foundation settlement rates are generally faster than those predicted by the 1-dimensional consolidation theory. (USBR)

Field 08-ENGINEERING WORKS

Group 8D-Soil Mechanics

A THEORETICAL STUDY OF THE PRESSURES ACTING ON A RIGID WALL BY A SLOPING EARTH OR ROCK FILL, New South Wales Univ., Kensington (Australia); and Dames and Moore, Sydney (Australia). I. K. Lee, and J. R. Herington. Geotechnique, Vol 22, No 1, p 1-26, Mar 1972. 16 fig, 5 tab, 23 ref.

Descriptors: "Retaining walls, "Gravity dams, Pressure, Walls, Fills, Earthfill, Rock fills, Slopes, Earth pressure, Theoretical analysis, Plasticity, Rotations, Bibliographies, Mathematical analysis, Concrete dams, Embankments.

Identifiers: "Passive pressure, "Dam stability, Active pressure, Lateral forces, Rankine pressure, Wall friction, Stability analysis, Rigid structures.

Evaluation of the stability of existing gravity dams stabilized by sloping earth or rock embankments led to a theoretical study of pressures exerted upon a wall by a fill. The pressures acting on a rigid retaining wall by a sloping backfill of an idealized material were evaluated by the theory of plasticity. Lower bound solutions for passive pressure failure states were first established. The velocity field was then derived from the stress field and the kinematic admirability of the field, and the kinematic admissibility of the velocity field for wall translation and rotation was velocity field for wall translation and rotation was investigated. Unique solutions were obtained for an associated flow rule material, provided the wall was translated or rotated about the base. Comparison of the theoretical values of the passive thrust components for a rough interface with reliable experimental values for a granular soil showed that the theoretical values agreed well with the measured ultimate values. The nouniform strain distribution in the soil mass does not allow the simultaneous development of the peak stress ratio at all points in the failure zones; thus, the plasticity solution can only provide an upper bound to the maximum possible passive thrust. (USBR)

HIGHLAND LAKE FALL CREEK BASIN, INDI-ANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Louisville, Ky.

Available from the National Technical Informa-tion Service as EIS-IN-72-4675-D, \$3.00 in paper copy, \$0.95 in microfiche. May 1972. 88 p, 1 map, 8

Descriptors: "Indiana, "Environmental effects, "Multiple-purpose reservoirs, "Dam construction, "Water supply development, Earth dams, Multiple-purpose projects, Dams, Spillway gates, Spillways, Concrete structures, Overflow, Flow control, Flow augmentation, Flood control, Flood protection, Recreation facilities, Reservoirs, Water quality, Wildlife habitats, Dependable supply, Water supply, Reservoir storage.

Identifiers: "Environmental Impact Statements, "Highland Lake Fall Creek Basin (Ind), Indiananolis (Ind).

This multiple-purpose reservoir project involves the construction of a rolled earth fill dam with a gated concrete overflow spillway located on Fall Creek near Indianapolis, Indiana. The total project will include about 15,250 acres of land and will provide flood control, water supply and recreation facilities for the Indianapolis area. The water facilities for the Indianapolis area. The water supply pool will inundate approximately 16.2 miles of Fall Creek, including the seven mile reach presently covered by Geist Reservoir. An additional 4.8 miles of Mud Creek will also be inundated. The wildlife habitats along the stream and reservoir banks to be inundated will be lost. The conversion of the free-flowing streams to slack water will modify the existing ecosystem. Water quality below the project will be temporarily degraded during construction. Alternatives considered include other damsites, flood plain zoning, acquisition of flood-prone lands, levees, channel improvement, and no development. (Ellis-Florida) W73-02253 PEARL RIVER BASIN, EDINBURG DAM AND LAKE, MISSISSIPPI AND LOUISIANA (DRAFT ENVIRONMENTAL IMPACT STATEMENT). Army Engineer District, Mobile, Ala.

Available from the National Technical Informa-tion Service as EIS-MS-72-4550D, \$8.50 in paper copy, \$0.95 in microfiche. May 1972. 125 p, 2 map, 1 tab.

Descriptors: *Mississippi, *Louisiana, *Environ-mental effects, *Multiple-purpose reservoirs, *Dam construction, Dams, Flood control, Flood "Dam construction, Dams, Flood control, Flood protection, Water resources development, Water quality control, Recreation, Recreation facilities, Lakes, Wildline habitats, Aquatic habitats, Tubidity, Silting, Flow augmentation, Flow control, Overflow, Spillways, Reservoir construction, Im-

poundments.
Identifiers: *Environmental impact statement,
*Edinburg Dam and Lake, Miss. and La.

*Edinburg Dam and Lake, Miss. and La.

This multiple-purpose reservoir project involves the construction of a dam with concrete and earthful non-overflow sections and a multi-gated spill-way. The project will be constructed for flood control, water quality control, and recreational purposes. The project will provide high quality open water recreation opportunities not available in a small stream. 16,000 acres of agricultural and forest land and its associated wildlife habitat will be lost as a result of its conversion to a lake environment. The change from free-flowing streams to a lake environment will alter the aquatic flora and fauna of the streambeds and associated flood plains. The resultant ecosystem will be less diversive and therefore less stable. Temporary increases in turbidity and siltation generally associated with water resources development will be experienced. Construction activities, particularly clearing and excavation, will generate solid wastes which require disposal. Alternatives considered include single-purpose projects, alternate sites and no development. (Ellis-Florida)

PUEBLO DAM AND RESERVOIR, FRYING-PAN-ARKANSAS PROJECT COLORADO (FINAL ENVIRONMENTAL IMPACT STATE-

Bureau of Reclamation, Washington, D.C.

Available from the National Technical Informa-tion Service as EIS-CO-72-4620-F, \$9.50 in paper copy, \$0.95 in microfiche. June 1, 1972. 148 p, 9 fig, 2 map, 7 photo, 1 tab, 4 append, 22 ref.

Descriptors: *Environmental effects, *Dams, Descriptors: *Environmental effects, *Dams, *Colorado, *Flood protection, Water supply, Mul-tiple-purpose projects, Reservoirs, Irrigation, Earthworks, Regulation, Municipal water, Water consumption, Industrial water, Recreation, Wil-dlife habitats, Waterfowl, Agriculture, Water storage, Storage, Relocation, Social aspects. Identifiers: *Environmental Impact Statements, *Pueblo Dam and Reservoir (Colorado), *Frying-ran_Atransproject

Pueblo Dam and reservoir is a major east slope feature of the Fryingpan-Arkansas Project located 6 miles west of Pueblo, Pueblo County, Colorado. Pueblo Dam will be an earthful embankment with a concrete massive head buttress type spillway structure. The dam will be 191 feet high and 2 miles long, It will provide storage and regulation of water supplies for irrigation, municipal and industrial use, flood control protection, recreation, fish and wildlife enhancement and sediment reduction. The reservoir will inundate eight small family farms. A seasonal fluctuation of about 80 feet from the conservation pool to the inactive pool will occur. Adverse effects include: regular inundation of approximately 4,646 acres of agricultural land, scarring of the existing landscape during construction of the dam, and impairment of wintering waterfowl habitat. Additionally there may be some short-term air and water pollution problems. Alter-

natives to the project were no action, enlargement of Twin Lakes Reservoir and location of the dam at another site. Only the present project derived the optimum benefits. Extensive agency comments are included. (Nielsen-Florida) W73-02265

SACRAMENTO RIVER BANK PROTECTION PROJECT, CALIFORNIA (DRAFT ENVIRON-MENTAL IMPACT STATEMENT). Army Engineer District, Sacramento, Calif.

Available from National Technical Information Service as EIS-CA-72-4556-D, \$5.25 in paper copy, \$0.95 in microfiche. April 1972. 56 p, 4 fig, 1 map, 7 photo, 1 tab.

Descriptors: "California, "Environmental effects, "Flood control, "Erosion control, Levees, Flood protection, Watershed management, River basin development, Flood plains, Erosion, Bank erosion, Embankments, Aesthetics, Levee districts, River regulation.

Identifiers: *Environmental Impact Statements, *Sacramento River (Calif).

The proposed project will provide protection for the existing levee system of the Sacramento River Flood Control Project by construction of 835,000 lineal feet of bank erosion control works and set-back levees along 184 miles of the Sacramento River from Collinsville to the vicinity of Chico, California. Presently over 352,000 lineal feet of California. Presently over 352,000 lineal feet of work has been completed or is underway at the most critical erosion sites. The area protected by the levees comprises over one million acres, in which about 50 communities are located. The bank protection will reduce the cost of emergency levee repairs, land losses caused by erosion, and the meed for downstream dredging of navigation channels. Adverse environmental effects include a loss of aesthetic, wildlife, and other natural riparian values of the river at some sites. Alternatives are discontinuing of the project, levee setbacks, revised levee encroachment standards, construction of additional reservoir storage, placement of stone along berms to protect berms, and construction of new berms. (Wheeler-Florida)

GLACIAL-DRIFT GAS IN ILLINOIS, Illinois State Geological Survey, Urbana. W. F. Meents.

W. F. Meents.
Illinois State Geological Survey Circular 292, 1960. 58 n. 24 fig. 2 tah.

Descriptors: *Natural gas, *Illinois, *Glacial drift, Soil profiles, Pleistocene epoch, Fuels, Methane,

Identifiers: *End moraines, Vacuum pumps, Wisconsinian glacial period, Sangamon soil

Glacial-drift gas in Illinois occurs mainly in the northeast fourth of the state. The gas is believed to normeas tourn of the state. The gas is occieved to be derived from buried soil zones and from organic material in deep buried valleys. The amount of morainic material above the gas-producing zone has been found to control the amount and quality of the gas, which is generally more concentrated and pure under the thick cover of the end moraines. Quantitative and technical data on the gas are given, such as methane content, type and number of wells in existence, volume of gas produced, formation vacuums, and location within specific soil zones. (Campbell-NWWA) W73-02391

CLINCHFIELD DAM AND RESERVOIR, BROAD RIVER BASIN, NORTH CAROLINA AND SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Army Engineer District, Charleston, S.C.

Available fi tion Service

Descriptors construction Carolina, *I Flood contr storage, W Sedimentati tion, Recrea trial water Water sup development Identifiers: *Clinchfie and South C

The project lated recres in North Ca burg, Sout reservoir fo al water s flood dama create a d needs of th verse envi wooded las sites of reg sites, alter water supp nel improv tion, and n W73-02524

> 8E. Roc Geol GEOLOG All-Union

Research For prima W73-0206

FUNDAM Australian J. C. Jaege

Descripto gy, Tensil als testing Compress *Strain, cavation.

A compre presented Analysis tion, El Behavior Effects, and Mini Campbe W73-023

SHEAR ! J. C. Jacs Geologic January-

Descript ties, Lab Available from the National Technical Information Service as EIS-SC-72-4575-D, \$3.00 in paper copy, \$0.95 in microfiche. May 31, 1972. 7 p.

Descriptors: *Multiple-purpose reservoirs, *Dam construction, *Environmental effects, *North Carolina, *Reservoir construction, Embankments, Flood control, Reservoirs, Earth works, Reservoir storage, Water storage, Water storage, Water storage, Fisheries, Recreation, Recreation facilities, Municipal water, Industrial water, Earth dams, Dependable supply, Water supply development, Water resources development. Identifiers: *Environmental Impact Statements, *Clinchfield Dam and Reservoir (North Carolina and South Carolina).

The project involves the construction of a 3,430 foot earthfill embankment with spillway and related recreation facilities on the upper Broad River in North Carolina about 18 miles north of Spartan-burg, South Carolina. The dam would form a reservoir for flood control, municipal and industrial water supply, water quality, recreation and economic development. The project would reduce flood damages for about 52 miles downstream and create a dependable water supply to meet the needs of the area at least until the year 2020. Adverse environmental effects include the loss of about 23,000 acres of mixed agricultural and wooded lands permanently inundated and loss of resources in the reservoir area. Several historical sites of regional importance may also be subject to inundation. Alternatives included other reservoir sites, alternative sources of obtaining water for water supply (intrabasin transfers), levees, chan-nel improvements, flood plain zoning and reloca-tion, and no action. (Nielsen-Florida)

8E. Rock Mechanics and Geology

GEOLOGY AND DAMS. VOLUME IV. All-Union designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR). For primary bibliographic entry see Field 08A. W73-02067

FUNDAMENTALS OF ROCK MECHANICS, J. C. Jaeger, and N. G. W. Cook.

Methuen and Co, Ltd, London, England, 1969. 513

Descriptors: *Rock mechanics, Structural geology, Tensile stress, Materials engineering, *Materials testing, Stress analysis, *Strength of materials, Compressive strength, Fluid mechanics, Ductility, *Strain, Elasticity (Mechanical), Plasticity, Ex-

A comprehensive overview of rock mechanics and the solutions to rock mechanics problems are presented. Topics include: Rock as a Material, Analysis of Stress and Infinitesimal Strain, Fric-Chanysis of Stress and Infinitesimal Strain, Friction, Elasticity, Fluid Pressure and Flow, Behavior of Ductile Materials, Time-Dependent Effects, Strain Waves, Geological Applications, and Mining and Other Engineering Applications. (Campbell-NWWA) W73-02372

SHEAR FAILURE OF ANISTROPIC ROCKS,

J. C. Jaeger. Geological Magazine, Vol 97, No 1, p 65-72, January-February, 1960. 5 fig, 6 ref.

Descriptors: *Rock mechanics, *Shear stress, Anisotropy, *Failure (Mechanics), Rock proper-ties, Laboratory tests.

Identifiers: *Fracture criteria, *Planes of weakness, Experimental results, Cleavage, Coefficient of internal friction.

The two-dimensional theory of two simple generalizations of the Coulomb-Navier criterion for shear failure is developed. The first of these refers to a material with a single plane of weakness which has a different shear strength and coefficient of internal friction from the remainder of the material. In this case it is shown that failure may take place, according to circumstances, either in the plane of weakness or in planes cutting across it. The second criterion refers to a layered material whose shear strength varies confunctions from a whose shear strength varies continuously from a maximum in one direction to a minimum in the perpendicular direction. In this case it appears that, instead of the two directions of failure possi-ble for an isotropic material, there is only one possible plane of failure which lies between the plane of minimum shear strength and the nearest to it of the two Coulomb-Navier planes. Numerical results are given for the case of uniaxial compression and experimental results are shown to be in reasonable agreement with them. (Campbell-NWWA) W73-02374

INITIATION OF GROUND-WATER FLOW IN JOINTED LIMESTONE, For primary bibliographic entry see Field 04B. W73-02375

FRACTURE CRITERION FOR BRITTLE

ANISOTROPIC ROCK, Woods Hole Oceanographic Institution, Mass. J. B. Walsh, and W. F. Brace. Journal of Geophysical Research, Vol 69, No 16, p 3449-3456, August 15, 1964.

Descriptors: *Rock mechanics, Rock properties, *Anisotropy, *Failure (Mechanics), Geologic con-trol, Crystalline rocks, Fractures (Geologic). Identifiers: *Brittle materials, Preferred orienta-tion, *Planes of weakness, Random orientation.

The McClintock-Walsh modification of Griffith theory is extended to treat brittle fracture of theory is extended to treat brittle fracture of anisotropic rock. It is suggested that anisotropy is due primarily to preferred orientation of cracks in rocks and that a satisfactory model for fracture analysis is an elastically isotropic medium which contains a nonrandom array of Griffith cracks. Fracture in tension and in compression is con-sidered. Determination of the effect of anisotropy upon the ratio of compressive strength to tensile strength shows that it can vary widely with sample orientation. (Campbell-NWWA) W73-02397

SOME RESULTS OF DRI INVESTIGATIONS-ROCK FAILURE IN PERCUSSION, Drilling Research, Inc., Houston, Tex. I. V. Pennington.

American Petroleum Institute Drilling and Production Practice, p 329-336, 1953. 6 fig.

Descriptors: *Drilling, Rock mechanics, Rock properties, *Mechanical equipment, Rotary drilling, *Laboratory tests, Optimization.

*High-speed photography, Drilling rate, *Impact energy, Static loading, Air hammers.

The amount of energy available at the bottom of The amount of energy available at the bottom of the hole in conventional drilling is limited. Faster drilling will depend largely upon a substantial increase in such energy. One approach to this goal is the transmission of electrical power to the bottom of the hole, and the use of primarily percussive devices on the rock. The relation of the energy, relacity to the convention of the control of the energy. velocity, momentum, etc. of the percussive blow to the amount of rock drilled was studied by ob-serving single-impact blows on the rock and successions of such blows. The amount of rock drilled depends upon the energy of the blow and not on the velocity. (Campbell-NWWA)

8F. Concrete

PRECAST CONCRETE SHOULD PROVE POPU-LAR FOR CRIR WALLING

Precast Concrete, Vol 3, No 4, p 207-212, April 1972. 11 illus, 10 photo, 3 ref.

Descriptors: *Retaining walls, *Precast concrete, Slope stabilization, Slopes, Hydrostatic pressure, Design criteria, Backfills, Crib walls, Cost comparisons, Foundations, Bearing capacity, Stabili-

Identifiers: Great Britain, *Cribbing, Sliding, Design assumptions.

A recent technique uses precast concrete units to retain the faces of embankments and cuttings. An interlocking box-like framework, when filled with aterial as the crib wall supports, stabilthe same material as the crib wall supports, stabil-izes itself. Openings between units may be planted with creepers to absorb moisture. Openings permit drainage, avoiding hydrostatic pressure on the completed wall. Designs are somewhat empirical, evolved from experience and observation. Crib walling is most suited where new embankments waning is most stuted where new emonantments are being created. Units can be erected by unskilled labor, a cast footing is usually not needed, and the wall can be dismantled or altered to fit changing conditions. In designing a crib wall, 4 conditions should be investigated: (1) Stability against overturning can be controlled by a suitable against overturing can be controlled by a suitable face slope; (2) resistance to sliding may be over-come by keying into the foundation; (3) soil beneath the foundation must be sufficiently strong to withstand vertical forces; and (4) stability of bank and wall as a unit must be examined. Crib walling in the United Kingdom is described and pictured. (USBR) W73-02079

CEMENT BOND LOGGING, AN AID TO BETTER COMPLETION PRACTICES, Jersey Production Research Co., Tulsa, Okla. E. J. Moore, and J. M. Bird. The Log Analyst, Vol 3, No 1, p 21-28, August,

Descriptors: Well data, Well casings, *Cement grouting, Grouting, Logging (RECORDING), *Electrical well logging, *Borehole geophysics, Concrete structures.

Identifiers: *Acoustic logging, Cement bonding, Completion practices.

The properties of the joint between cement and well casing which can be measured with an acoustic device known as a Cement Bond Logging tool are discussed. An attempt is made to show a tool are discussed. An attempt is made to show a correlation between measurements made by this device and the ability of the joint to conduct fluid longitudinally in the borehole. The presence of a pipe signal was found to indicate that the pipe was free to move inside of its cement sheath, meaning that such a joint would conduct fluid, or, in other words, a poor joint between casing and cement existed. (Campbell-NWWA)
W73-02385

WELL GROUTING AND WELL PROTECTION, Layne and Bowler, Inc., Memphis, Tenn. K. E. Moehrl.

Journal of the American Water Works Association, Vol 56, No 4, p 423-431, April, 1964. 2 fig, 2 tab, 5 ref.

Descriptors: *Grouting, *Water wells, *Portland cements, *Slurries, Air entrainment, *Cement

Field 08—ENGINEERING WORKS

Group 8F-Concrete

grouting, Hydration, Hydrolysis, Bentonite, Well casings.
Identifiers: *Sealing, False set, Heat of hydration,
Flash set, *Neat cements, Volumetric shrinkage.

Reasons for grouting and sealing of wells, specifications for grouting material including setting time and final properties, and methods of emplacement of grouting are discussed. Grouting failures are attributed to: (1) Insufficient volume of cement; (2) Formation characteristics in which cementing does not prevent migration of fluids; (3) Channelling in the grout; (4) Failure of equipment or faulty installation of cementing equipment; (5) Failure to seal cracks and crevices in the formation: and (6) Proor water-cement ration. (Cambbellion: and (6) Proor water-cement ration. (Cambbellion: and (6) Proor water-cement ration. tion; and (6) Poor water-cement ration. (Campbell-NWWA) W73-02408

A PROVEN SQUEEZE-CEMENTING TECHNIQUE IN A DOLOMITE RESERVOIR.

J. L. Goolsby.

Journal of Petroleum Technology, Vol 21, No 10, p 1341-1346, October, 1969. 6 fig, 2 tab.

Descriptors: *Cement grouting, Slurries, *Oil wells, Oil reservoirs, *Hydraulic design, *Injection, Texas, Porosity, Dolomite, Oil industry. Identifiers: *Water confinement, *Squeeze cementing, Waterflood techniques.

A technique which had 82.5 percent success in confining injected water to the portion of the gross pay thickness that was continuous areally and that contained the bulk of the reserves recoverable by waterflood in a West Texas reservoir is discussed. water hood in a west rekars reservoir is unscussed.

Reasons for failures are inferred by graphical methods, and best formulae for the cement slurry based on probable success ratio are given. The technique has also found application in squeezing off bottom water in producing wells prior to per-forating. (Campbell-NWWA) W73-02421

8G. Materials

THE ASPHALTIC LINING OF DUNGONNEL Ferguson and McIlveen, Belfast (Northern Ireland).

For primary bibliographic entry see Field 08A. W73-02073

RADIOISOTOPE INVESTIGATION RADIOISOTOPE
INVESTIGATION
TECHNIQUES IN ENGINEERING GEOLOGY
AND HYDROGEOLOGY (RADIOIZOTOPNYYE
METODY ISSLEDOVANIYA V INZHENERNOY
GEOLOGII I GIDROGEOLOGII),
All-Union Scientific Research Inst. of
Hydrogeology and Engineering Geology, Moscow
(1650).

Hydrogeology and Engineering Geology, Moscow (USSR).
V. I. Ferronskiy, A. I. Danilin, V. T. Dubinchuk,
V. A. Polyakov, and V. S. Goncharov.
Izdatel stvo: Atomizdat, Moscow, 1968. 304 p.
(English translation also available as U.S. Atomic
Energy Commission, Division of Technical Information Report AEC-TR-7230 (TID-4500).

Descriptors: *Analytical Descriptors: "Analytical techniques, "Radioisotopes, "Isotope studies, "Engineering geology, "Hydrogeology, Logging (Recording), Radioactivity, Radiation, Density, Absorption, Moisture content, Aqueous solutions, Ground-water, Rocks, Rock properties, Effluents, Water pollution, Tracers, Instrumentation, Measure-

Identifiers: *USSR. *Hydrogeochemistry, Neutron methods, Gamma-ray methods, Backscattering, Sorbents.

Results are presented of investigations carried out at the Moscow All-Union Scientific Research Institute of Hydrogeology and Engineering Geology

(VSEGINGEO) and devoted to development and application of radioactive tracer techniques in engineering géology and hydrogeology. Particular attention is given to the validity of these methods and to the solution of practical problems. Use of nuclear radiation to determine rock properties by methods such as radiation logging and profiling is examined together with the use of radioactive tracers in hydrogeology and hydrogeochemistry and the problem of radioactive contamination of groundwater. (Josefson-USGS) W73-02328.

MAINTAINING WATER WELL YIELD, Universal Oil Products, St. Paul, Minn. Johnson

Div. G. F. Briggs, J. L. Mogg, and H. O. Williams. Industrial Water Engineering, Vol 4, No 7, p 28-

Descriptors: "Iron, "Iron bacteria, Chlorination, Acids, "Maintenance, Phosphates, Water wells, Water yield improvement. Identifiers: "Incustation, Surging, "Well clean-ing, Hydrochloric (Muriatic) acid, Sulfamic acid.

Practical considerations in evaluating and correcting problems which affect well production are reviewed. Chemical incrustation, with particular reference to iron, is discussed along with its causes and preventative measures. Acid treatment in action of the control of the con ment, in particular, as a means of removing incrustation, is treated in detail. A system of preventative maintenance, whereby once every eight months to a year a well driller is called to clean a well is recommended. (Campbell-NWWA) W73-02369

FUNDAMENTALS OF ROCK MECHANICS, Australian National Univ., Canberra. For primary bibliographic entry see Field 08E. W73-02372

THE DELTA-LOG, A DIFFERENTIAL TEM-PERATURE SURVEYING METHOD, Westronics, Inc., Fort Worth, Tex. R. B. Basham, and C. W. Macune. Petroleum Transactions, AIME, Vol 195, p 123-128, 1952. 6 fig, 3 ref.

Descriptors: Data collections, *Temperature, *Thermal conductivity, *Oil industry, *Logging (Recording), Subsurface investigations, Recording), Subsurface investigations, Boreholes, Well casings. Identifiers: *Temperature differential measure-

ment, Temperature gradient.

Very small anomalies in oil well temperatures are detected and measured by recording the difference in temperature existing between two thermally sensitive elements which are spaced several feet apart on a small diameter carrier and lowered into the born het. The lements contain in a block of the contained of t apart on a small diameter carrier and lowered into the bore hole. The elements operate in a balanced electrical circuit, sending only a reference signal to the surface as long as normal gradient temperatures are encountered. When either element enters a temperature disturbance, the circuit is unbalanced and produces large recorder deflections for minute anomalies. The system is highly sensitive to small changes in thermal gradients caused by gas or fluid movements and to the boundaries between beds of different thermal conductivities. Typical logs show successful applications of the process to locating gas and water leaks in casing, gas entry, and gas oil contact. (Campbell-NWWA) W73-02380

SPECIAL APPLICATION OF DRILL-STEM
TEST PRESSURE DATA, Petroleum Research Corp., Denver, Colo. J. P. Dolan, C. A. Einarsen, and G. A. Hill. Petroleum Transactions, AIME, Vol 210, p 318-324, 1957. T.P. 4667, 7 fig. 15 ref. Descriptors: Drilling, Rotary drilling, *Explora-tion, Pressure, *Pressure measuring instruments, Permeability, *Drilling fluids. Identifiers: *Drill-stem testing, Formation

How the following formation characteristics can be determined mathematically from drill-stem test pressure charts is described: true formation pressures, effective permeability of the entire section tested, well productivities, wellbore damage, and possible detection of barriers (faults, pinchouts, etc.). A practical method is presented for immediate determination of effective permeability and wellbore damage from successful double shut-in pressure tests. Recommendations for improving the reliability of drill-stem test pressures are listed. (Campbell-NWWA) W73-02383

HOW TO DULL A BIT FOR FUN AND PROFIT, W. W. Moore. w. w. Moore. Drilling, Vol 29, No 3, p 64-65, March, 1968. 6 fig, 1 tab.

Descriptors: *Rotary drilling, Drilling, *Optimiza-tion, Theoretical analysis, Methodology, *Graphi-cal analysis, Costs, Economic efficiency, Penetra-tion, Rates. Identifiers: *Field procedures, Bit weight, Rotary speed, Hole cleaning.

Factors affecting the instantaneous rate of penetration into geologic materials with the hydraulic rotary drilling system are analyzed. Increasing weight on the bit results in a proportional increase in drilling rate. Theoretically, under 'perfect-cleaning' conditions, drilling rate should increase with the square of bit weight, but 'perfect-cleaning' conditions are impossible to achieve. Penetration rate is shown to increase, but less than proportionally, with increase in rotary speed. Again, the lack of perfect-cleaning' at the bit is the main culprit. The 'Drill-Off' technique for determining optimum bit weight and rotary speed for a given formation is explained. (Campbell-NWWA) W73-02387

FULL CORE RECOVERY IN UNCON-SOLIDATED FORMATIONS, Holmes and Narver, Inc., Las Vegas, Nev. V. Read. Drilling, Vol 24, No 11, p 41-46, August, 1963.

Descriptors: Drilling, Rotary drilling, Cores, "Core drilling, Sampling, "Unconsolidated sedi-ments, Weight, Exploration, "Drilling equipment. Identifiers: "Diamond drilling, Mining engineering. Rotary speed.

A technique for achieving nearly complete core recovery in unconsolidated formations, using a combination of oil field rotary and mining diamond core equipment is explained. This approach utilizes the oilfield's heavy drill collars, rotary stabilizers, and thick vibration-reducing oil emulsion drilling fluid, together with the precise hydraulic feed control, fast bit rotation, light weight, hard rock core barrel and multi-step diamond bits common in mining industry diamond drilling. Problems encountered in the development of the method and their solutions are listed. (Campbell-NWWA)

ELECTRICAL WELL LOGGING FUNDAMEN-TALS, Halliburton Oil Well Cementing Co., Duncan, For primary bibliographic entry see Field 08B. W73-02392

THE SIDEWALL EPITHERMAL NEUTRON POROSITY LOG, Schlumberger Well Surveying Corp., Ridgefield,

J. Tittman, H Alger. Journal of P p 1351-1362, end.

Descriptors: well logging Salinity, Hy logs. Identifiers: ' Mudcake, C

A sidewall developed to log interpredirectionally tion system source-detec The effects shape, mud greatly reduc ng of neutro nparison a formation limestones a (Campbell-N W73-02396

THE USE EVALUATION Shell Develo tion and Proc Geophysics, 1960. 15 fig. Descriptors:

*Acoustics, *Sandstones Identifiers: Hydrocarbon (SP), *Data i

Acoustic vel pendent on ferential bet Although the which have sandstones, made from velocities are ferential an between ac ferential in been empiri well-bore me relations am self potential it appears the rocks can be sistivity of a the self-pote mate the sha rect velocitie NWWA) W73-02401

ELECTRIC WATER EX Water Branc P. H. Jones, Geophysics, fig, 3 tab, 8 n

Descriptors: Water wells cal well lo Porosity, Sal Identifiers: C terpretation. J. Tittman, H. Sherman, W. A. Nagel, and R. P. Journal of Petroleum Technology, Vol 18, No 10, p 1351-1362, October, 1966. 20 fig, 2 tab, 12 ref,

Descriptors: Logging (Recording), *Radioactive well logging, *Neutron absorption, *Porosity, Salinity, Hydrogen, Drilling fluids, Lithologic

logs.
Identifiers: *Neutron detection, *Fast neutrons, Mudcake, Caliper log.

A sidewall epithermal neutron tool has been A sidewall epithermal neutron tool has been developed to substantially reduce environmental effects that have previously complicated neutron log interpretation. In this new device a directionally sensitive epithermal neutron detection system has been incorporated in a sidewall source-detector skid to minimize borehole effects. The effects of variations in borehole size and these mud type temperature and salinity are shape, mud type, temperature and salinity are greatly reduced. The log presents a direct record-ing of neutron derived procedures. ing of neutron-derived porosity on a linear scale. Comparison with a linear porosity presentation of companison with a mean protonty presentation of a formation density log permits sandstones, limestones and dolomites to be readily identified. (Campbell-NWWA) W73-02396

THE USE OF ACOUSTIC LOGS IN THE EVALUATION OF SANDSTONE RESERVOIRS, Shell Development Co., Houston, Tex. Exploration and Production Research Div.

Geophysics, Vol. 25, No 1, p 250-274, February, 1960. 15 fig.

Descriptors: *Logging (Recording), Geophysics, *Acoustics, Porosity, Exploration, Well data, *Sandstones, Reservoirs, Core logging, Evalua-

identifiers: *Sonic velocity, Pressure differential, Hydrocarbons, Petroleum industry, Self-potential (SP), *Data interpretation.

Acoustic velocities in sandstones are primarily dependent on porosity, shaliness, and pressure dif-ferential between overburden and fluid pressures. terential between overburden and riting pressures.

Although there are undoubtedly other variables which have some effect on acoustic velocities in sandstones, usable porosity predictions can be made from acoustic borehole logs if measured velocities are corrected for effects of pressure differential and shaliness. A theoretical relation between acoustic velocity and pressure dif-ferential in a hexagonal packing of spheres has been empirically extended by correlation of been empirically extended by correlation of laboratory measurements on cores with actual well-bore measurements. A system of empirical relations among acoustic velocity, porosity, and self potential of sandstones is developed. Further, it appears that the resistivity of water in permeable rocks can be estimated from the velocity and resistivity of adjoining shales. When this is possible, the self-potential (SP) log can then be used to estimate the shaliness of a sandstone in order to cornate the sames of a sandsonic in order to correct velocities for porosity estimates. (Campbell-NWWA)
W73-02401

ELECTRIC LOGGING APPLIED TO GROUND WATER EXPLORATION,
Geological Survey, Baton Rouge, La. Ground

Water Branch.

Water Branch.
P. H. Jones, and T. B. Buford.
Geophysics, Vol 16, Nos 1-4, p 115-139, 1951. 12
fig, 3 tab, 8 ref.

Descriptors: Logging (Recording), Exploration, *Water wells, Well data, *Water quality, *Electrical well logging, Sand aquifers, Resistivity, Porosity, Saline water intrusion.

Identifiers: Gulf coast, Granular aquifers, *Log interpretation

A method is described for the determination of the A method is described for the determination of the quality of ground water in granular aquifers penetrated by rotary-drilled holes electrically logged. Conventional techniques of electric-log in-terpretation, to determine true bed resistivity from arent resistivity values, are briefly described; apparent resistivity values and a method for converting water-resistivity values into hypothetical chemical analyses is explained. The objective of the method is to narrow the limits of error in quality-of-water estimates based upon electric logs. Methods of determining formation provisity in situ, which is an important factor in salt-water-encroachment problems are discussed. (Campbell-NWWA)
W73-02402

MICROBIOLOGICAL CORROSION OF IRON

AND STEEL, Minnesota Mining and Mfg. Co., St. Paul.

D. M. Updegraff.
Corrosion, Vol 11, No 10, p 44-48, October, 1955.

Descriptors: Corrosion, Corrosion control, *Iron bacteria, *Electrochemistry, Anaerobic bacteria, Microorganisms, Catalysts, Alkalis (Bases), *Water treatment, Hydrogen ion concentration. Identifiers: *Microbiological corrosion, Depolarization, *Galvanic cells, *Sulfate-reducing bacteria, Germicidal treatment.

A critical review of the literature on microbiological factors involved in the corrosion of iron and steel is presented. A brief account of the historical aspects of the subject is given along with a discussion of the mechanisms by which microorganisms affect corrosion, a description of some typical examples of microbiological corrosion and a discussion of methods used to prevent microbiological corrosion. How anaerobic bacterial corrosion is carried out by sulfate-reducing bacteria is described. Methods of alleviating microbiological corrosion include cathodic protection, protective coatings, germicide treatment of water, and alkali treatment. (Campbell-NWWA) W73-02403

MICROBIOLOGICAL CORROSION IN WATER

FLOODS, Buckman Labs., Inc., Memphis, Tenn. Petroleum Section.
J. M. Sharpley

Corrosion, Vol 17, No 8, p 92-96, August, 1961.

Descriptors: Corrosion, *Corrosion control, Bacteria, *Sulphur bacteria, Microbiology, *Iron bacteria, Anaerobic bacteria, Enzymes, Cultures. Identifiers: Waterflooding (Oil recovery), *Desulflovibrio desulfuricans, Hydrogenase.

It is commonly observed that most bacterial corrosion in waterfloods occurs as pit corrosion. A hypothesis has been advanced to explain a portion of the mechanism underlying bacterial pit corro-sion and a suggested method has been presented sion and a suggested method has been presented for determining the possible relationships between the general microbial flora and microorganisms capable of participating in pit corrosion. Topics discussed include role of sulfate-reducing bac-teria, correlation between bacteriological examinations and corrosion damage, cultural techniques, laboratory and field evaluation techniques, and detection of sessile microorganisms. (Campbell-NWWA)

INTERPRETATION OF TEMPERATURE LOGS IN WATER- AND GAS-INJECTION WELLS AND GAS-PRODUCING WELLS,

Bird Well Surveys, Bradford, Pa.

American Petroleum Institute Drilling and Production Practice, p 187-195, 1954, 6 fig. 1 tab. 3 ref.

Descriptors: *Logging (Recording), Surveys, *Geothermal studies, *Injection wells, Natural gas, Mathematical studies, Permeability, Borehole geophysics. Identifiers:

geophysics.
Identifiers: "Water flooding, "Temperature logging, Petroleum industry, Geothermal gradient.

The use of temperature surveys for detecting and recording the direction and extent of fluids in a bore hole is discussed. The general shape of temperature logs in water-injection wells is discussed in the light of the principles of heat transfer involved. The mathematics is evolved to express this relationship, followed by empirical data substantiating the assumptions on which the mathematics is based. The importance of correct field techniques in running this type of survey is emphasized. The reversibility of the concepts developed are demonstrated in analyzing temperadeveloped are demonstrated in analyzing temperadeveloped are demonstrated in analyzing tempera-ture curves in a well flowing water and oil. Analy-ais of field data is shown. The similarity and dif-ferences between a flowing water and oil well and a gas-producing well are demonstrated, with sug-gestions as to a method of interpreting tempera-ture logs of the latter type. (Campbell-NWWA) W73-02405 developed are demonstrated in analyzing tempera-

CABLE TOOL DRILLING, AN INVESTIGA-TION OF THE RELATION BETWEEN THE NATURAL STROKE FREQUENCIES OF CA-BLE-TOOL SYSTEMS AND THE OPERATING STROKES PER MINUTE, DeGolyer, MacNaughton, and McGhee, Dallas,

1ex.

K. Sprengling, and E. A. Stephenson.

American Petroleum Institute Drilling and Production Practice, p 64-72, 1940. 13 fig, 1 tab, 2 ref.

Descriptors: *Drilling equipment, *Well data, Optimization, Dynamometers, Vibrations, Penetra-tion, Mathematical studies.

Identifiers: *Cable tool drilling, *Well logs, Natural frequencies, Harmonics, Damping, Gas wells,

Examination of 'drilling-time logs' by successive depth intervals or zones of 500 ft. indicates that several zones are characterized by a decreased several zones are connected by a corresponding rate of penetration and an increased amount of time shut down for repairs of the drilling equipment. A comparison of the drilling equipment accomparison of the drilling action of a standard cable-tool system with an ideal clastic system shows that maximum tool motion is developed when the ratio between the drilling frequency of the system is unity. (Campbell-NWWA) W73-02407

PHOTOGRAPHIC EXAMINATION OF WELLS, Layne Texas Co., Inc., Houston, Tex. O. F. Jensen, Jr.

Journal of the American Water Works Associa-tion, Vol 57, No 4, p 441-447, April, 1965, 7 fig.

Descriptors: *Water wells, *Cameras, *Logging (Recording), Sampling, Turbidity, *Surveys, Inspection.
Identifiers: *Well photography, Visual inspection,
Direct methods, *Borehole cameras.

Now that the subscope camera has been developed, photographs can be obtained that clearly show specific conditions as they exist in a well. The most common uses of the subscope camera are described. Uses include: New well surcamera are described. Uses include: New weat surveys, well swages, debris analysis for removal, checking damaged casings and screens, checking cleaning procedures, and identifying formation

composition. Procedures are described for elimination of turbidity so that good photographs may be taken. (Campbell-NWWA) W73-02409

THE ANALYTICAL CONTROL OF ANTI-CO-RROSION WATER TREATMENT, California Univ., Berkeley.

Field 08-ENGINEERING WORKS Group 8G-Materials

For primary bibliographic entry see Field 05F. W73-02411

TESTING FOR AND THE DEVELOPMENT OF GROUND WATER SUPPLIES, Maher (D. L.) Co., Woburn, Mass. For primary bibliographic entry see Field 04B. W73-02412

READERS COMMENT ON STEP DRAWDOWN TEST,

Technical Services Ltd., Lahore (Pakistan). R. F. Stoner, and D. H. Lennox. Johnson Drillers' Journal, Vol 41, No 1, p 10-12, Jan.-Feb., 1969.

Descriptors: Water wells, *Pump testing, Measurement, *Discharge measurement, Piezometers, Well screens, *Drawdown, Mathematical studies. Identifiers: *Constant-rate drawdown test, *Stepdrawdown test, Well loss.

Two replies to the question of the usefulness of Jacob's step-drawdown test are presented. In a West Pakistan study, it was found that small errors in discharge measurements affected results drasti-cally. An alternate method of determining well losses by comparing measurements in piezometers at varying distances from a well was discussed.

Partial penetration of an aquifer was found to have little relevance. The Canadian study, on the other hand, indicated that if results of constant rate tests and step-drawdown tests fail to agree, then the exception of the control of the cont planation may lie either with faulty extrapolation of drawdown trends or an omission of pertinent in-formation. (See also W69-05813) (Campbell-NWWA) W73-02419

SECONDARY DEPOSTION OF IRON COM-POUNDS FOLLOWING ACIDIZING TREAT-MENTS,

Dow Chemical Co., Los Angeles, Calif. Dowell

C. F. Smith, C. W. Crowe, and T. J. Nolan, III.
Journal of Petroleum Technology, Vol 21, No 9, p 1121-1129, September, 1969.

Descriptors: *Iron compounds, *Scaling, Dis-solved solids, *Water wells, Solubility, Ions, Elec-trochemistry, Hydrogen ion concentration, Chemical precipitation.

Identifiers: *Well development, Acidizing wells, Secondary precipitation, *Sequestering agents, *Deposition (Chemical), Incrustation, Formation

A review of the chemistry of iron in wells before, A review of the chemistry of iron in wells before, during and after acidizing treatments is presented. The relative merits of sequestering agents used to prevent secondary deposition following acid treatments are discussed. Iron sequestering agents were found generally necessary in treating formations with high (0.5 to 3.5 percent) iron mineral content. Guides for the selection of sequestering agents based upon temperature, ratio of iron (III to iron (III), BHT, acid reaction time, iron scale compostion, and formation iron content are given. postion, and formation iron content are given. (Campbell-NWWA) W73-02420

LOG INTERPRETATIONS IN SANDSTONE

RESERVOIRS, Gulf Research and Development Co., Pittsburgh,

For primary bibliographic entry see Field 04B. W73-02423

WELL LOGS IN CARBONATE RESERVOIRS, For primary bibliographic entry see Field 04B. W73-02424

8H. Rapid Excavation

CONSTRUCTION OF WASTEWATER FACILI-TIES, AUSTIN, TEXAS (FINAL ENVIRONMEN-TAL IMPACT STATEMENT). Environmental Protection Agency, Dallas, Tex. For primary bibliographic entry see Field 05D. W73-01980

MERSEY KINGSWAY TUNNEL: CONSTRUC-TION, Nutall (Edmund) Ltd. (England); and Mott, Hay and Anderson (England).
For primary bibliographic entry see Field 08A.
W73-02078

YIELDS OF DEEP SANDSTONE WELLS IN ORTHERN ILLINOIS, Illinois State Water Survey, Urbana. For primary bibliographic entry see Field 03B. W73-02386

81. Fisheries Engineering

THE GERMAN CARP (CARASSIUS AURATUS GIBELIO BLOCH) FROM THE ILOWNICA RIVER STOCKED IN A CARP POND, Polish Academy of Sciences, Krakow. Zaklad Biologii Wod. S. Skora.

Acta Hydrobiol. Vol 13, No 2, p 217-232. 1971. Identifiers: Carassius-auratus-gibelio, *Carp (German), *Ilownica River, *Poland, Ponds, Rivers, *Stocked fish.

This study was based on the results of measurements of 96 German carp specimens collected at random from a population cultivated in the Mynski pond at the Landek farm managed by the Laboratory of Water Biology of the Polish Academy of Sciences in Cracow. On the basis of body measurements and of other investigations, the German carp is a form typical of this species. With regard to its external apprearance, coloring, share of to its external appearance, coloring, shape of body, meristic and anatomical features it corresponds to the German carp (C. auratus gibelio Bloch) described by other authors.—Copyright 1972, Biological Abstracts, Inc.

HYDRAULIC MODEL STUDIES OF SCOGGINS DAM FISH TRAP AERATOR AND SUPPLY STRUCTURE, Bureau of Reclamation, Denver, Colo. G. L. Beichley. Report REC-ERC-72-27, July 1972. 8 p, 10 fig, 2

Descriptors: *Air entrainment, *Water measurement, Energy dissipation, Hydraulic structures, Hydraulic design, Hydraulic models, Valves, Laboratory tests, Flow measurement, Stilling

Laboratory tests, Flow measurement, Staning basins, Oxygenation.

Identifiers: Tualatin Project (Oregon), Scoggins Dam (Oregon), Ute Dam Outlet Works (New Mexico), China Meadows Dam (New York), "Aeration, Air bubbles, Baffle piers, Deflectors, Test

Laboratory studies were made of the Scoggins Dam fish trap aerator and supply structure with a 1:3.33 scale model to aid the development of the hydraulic design. A horizontally mounted fixed-cone valve discharging into a containment structure, followed by a stilling basin, was used to aerate the flow and to dissipate the flow energy before releasing it to the constant-head-orifice flow measurement structure. Results showed that the measurement structure. Results showed that the valve containment structure and stilling basin per-form very well as an aerator and energy dissipator to provide quiet, oxygenated flow that could be

measured and regulated in the constant-head-ori-fice structure. (USBR)

ASPECTS OF THE CHARACTERIZATION, IDENTIFICATION, AND ECOLOGY OF THE BACTERIAL FLORA ASSOCIATED WITH THE SURFACE OF STREAM-INCUBATING PACIFIC SALMON (ONCORHYNCHUS) EGGS, Fisheries Research Board of Canada, Nanaimo

(British Columbia). Biological Station. G. R. Bell, G. E. Hoskins, and W. Hodgkiss J Fish Res Board Can. Vol 28, No 10, p 1511-1525.

Identifiers: Acinetobacter, Aeromonas, *Bacterial flora, Chromobacterium lividum, Cytophaga spp, Ecology, Eggs, Enterobacter, Flora, Incubation, Oncorhynchus, Oncorhynchus gorbuscha, Oncor-hynchus keta, *Pacific salmon, Pseudomonas spp, *Salmon eggs, Streams.

Stream-incubating eggs of chum (O. keta) and pink (O. gorbuscha) salmon usually appeared to have a characteristic bacterial flora associated with the radiate membrane or 'capsule,' Cytophaga spp. predominating over pseudomonads and other species. In comparison, populations on simulated egg surfaces (polyethylene spheres) consisted mostly of Pseudomonas spp. and Chromobacterium lividum, suggesting that the surface of the incubating egg is bacteriologically selective. The bacterial flora of dead eggs consisted mostly of Pseudomonas spp., whereas the ambient stream waters contained members of Acinetobacter, Aeromonas, Enterobacter, and 2 actinomycetes in addition to members of the genera found on eggs and 'simulated eggs.' Some characteristics of the bacteria found associated with the surface of the embryonated egg are examined in relation to egg survival. The embryonated egg is regarded as part of a dynamic ecosystem, coined the 'oosphere,' and it is suggested that egg mortality probably depends more upon the results of complex interactions between the egg, its microflora, and its ambient waters than upon the presence of an obligate pathogen.—Copyright 1972, Biological Abstracts, W73-02565

GROWTH RESPONSES OF YOUNG SOCKEYE SALMON (ONCORHYNCHUS NERKA) TO DIF-FERENT DIETS AND PLANES OF NUTRITION, Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station. J. R. Brett.

J Fish Res Board Can. Vol 28, No 10, p 1635-1643,

Identifiers: *Diets, *Growth (Fish), *Nutrition, Oncorhynchusnerka, Plankton, Salmon, *Sockeye

The growth rate and food conversion efficiency of yearling O. nerka (26 plus or minus 2 g) was determined for Halver's test diet, Clark's chinook mash, Abernathy pellets, frozen marine zooplankton, and sockeye mash, using a number of planes of nutrition. The maximum growth rates at 15C varied from 3.1% dry body wt/day (Halver's) to 1.5%/day (marine zooplankton) with corresponding gross conversion efficiencies of 48 and 10%. Maintenance rations were determined, mostly by extrapolation, and used to evaluate the net conversion efficiency for each diet. The highest was 74% net conversion on Halver's test diet. Although major differences in growth response existed between the 5 diets, it was concluded that the various moist diets based on fish meal, used in these and earlier experiments, were not significantly dif-ferent from each other when on the same plane of nutrition .-- Copyright 1972, Biological Abstracts, W73-02571

G. Southw Trans Am Identifiers bow trout River (Was

INTERA

VIRONN GROWT COMPO Skidawa

J. W. An

Trans An

talurus pi

Channel

were mai 26, 30 and

After 12

sacrificed

and fatty

Substanti lesser gro

feeding ra

for rapid

temperati of whole

aenoic ac peratures.

W73-0257

AGE, GR

MO GA TRIBUTA

Michigan

Marquette T. M. Star

Trans An

Identifier

*Lakes, ! trout, Sali

1951-59 w

migrating ship was: radius (mi

0.0000138

ing autum 0.29% age

migration age III. between 2

ing water

juveniles i

sequent d

76 mm per Great Lal

Ocean tril

in Pacific

III. Time

Lakes trib

Copyright W73-0257

FISHERY

Internation

Wash.

(mm) a

Estimates steelhead the Stillage

Secondary Publication and Distribution—Group 10C

INTERACTIONS OF FEEDING RATES AND EN-INTERACTIONS OF FEEDING RATES AND ENVIRONMENTAL TEMPERATURE ON GROWTH, FOOD CONVERSION, AND BODY COMPOSITION OF CHANNEL CATISH, Skidaway Inst. of Oceanography, Savannah, Ga. J. W. Andrews, and R. R. Stickney.
Trans Am Fish Soc. Vol 101, No 1, p 94-99, 1972. Identifiers: Catfish, *Channel Catfish, Fattyacids, Feeding rates (Fish), Food, *Growth (Ffish), Ictalurus punctatus, Lipids, Temperature.

Channel catfish (Ictalurus punctatus) fingerlings were maintained in 20-gal glass aquaria at 18, 22, 26, 30 and 34C. Duplicate groups at each tempera-ture were fed 2, 4, and 6% of their biomass daily. After 12 weeks sample fish from each group were Arter 12 weeks sample fish from each group were sacrificed and analyzed for total body lipid content and fatty acid composition. Highest gains and the best food conversion ratios were achieved at 30C. Substantial gains were noted at 26 and 34C with lesser growth at 18 and 22C. At all temperatures a feeding rate of 4% of biomass daily was sufficient for rapid growth. An increase in environmental temperature from 18 to 34C resulted in a near linear increase in lipid content from 23.8 to 43.6% of whole carcass. Arachidonic and docosahexaenoic acid levels increased with decreasing temperatures.—Copyright 1972, Biological Abstracts, Inc. W73-02572

AGE, GROWTH, AND DOWNSTREAM MIGRA-TION OF JUVENILE RAINBOW TROUT (SAL-MO GAIRDNERI) IN A LAKE MICHIGAN

MO GARRICER IN A LARE MICHIGAN TRIBUTARY, Michigan Dept. of Natural Resources, Marquette. Marquette Fisheries Research Station. T. M. Stauffer. Trans Am Fish Soc. Vol 101, No 1, p 18-28, 1972.

Identifiers: *Age, *Growth (fish), Juvenile, *Lakes, Michigan, *Migration (fish), *Rainbow trout, Salmo-Gairdneri, Scale, Trout.

Juvenile rainbow trout were examined during 1951-59 while in stream nursery areas and when migrating downstream. Their body-scale relationship was: total length (mm) equal 4.06 + 2.10 scale radius (mm x 107) and relationship between length (mm) and weight (g) was W equal 0.00001384L3.0426. Age composition of trout during autumn in the nursery areas averaged 68% age 0.29% age I and 3% age II; trout in the downstream migration averaged 64% age I, 34% age II and 2% age III. Most downstream migration occurred between 21 May and 30 June, at night, on subsiding water levels and at water temperatures of 9-17C. There was an association between number of juveniles in the nursery areas and numbers of subrequents in the future areas and numbers of subsequent downstream migrants. Trout grew about 76 mm per year; growth was similar to that in other Great Lakes tributaries and to growth in Pacific Ocean tributaries. Most downstream migrants in Great Lakes tributaries were age II or less, while in Pacific Ocean tributaries, most were age II and III. Time of migration was about the same in Great Lakes tributaries as in Pacific Ocean tributaries.— Copyright 1972, Biological Abstracts, Inc. W/3-02574

EVALUATION OF A WINTER STEELHEAD FISHERY ON A WESTERN WASHINGTON RIVER, International Pacific Halibut Commission, Seattle,

G. Southward, and J. Douglas.
Trans Am Fish Soc. Vol 101, No 1, p 29-34, 1972.

inus. Identifiers: *Fishery management, Rivers, *Rain-bow trout, *Washington, Winter, *Stillaguamish River (Wash.).

Estimates were made of the sport catches of adult steelhead (Salmo gairdneri) in the North Fork of the Stillaguamish River for the winters of 1962-63

(20,000 fishermen) and 1963-64 (11,600 fishermen). Average catch per fisherman was 0.25 fish/day in the first season and 0.35 in the second. Total catches were approximately 5000 and 4000 steel-head, respectively. Releases from semi-natural rearing ponds made up nearly 34% of the 1963-64 catch, while hatchery releases were about 18% of the 1963-64 catch.—Copyright 1972, Biological Abstracts, Inc. W73-02575

INDUCED AGGREGATION OF POND-REARED RAINBOW TROUT (SALMO GAIRDNERI) THROUGH ACOUSTIC CONDITIONING,

Washington Univ., Seattle. Coll. of Fisheri R. R. Abbott. Trans Am Fish Soc. Vol 101, No 1, p 35-43, 1972.

Illus. Huss. *Acoustic stimulus, *Aggregation, Conditioning (fish), Ponds, *Rainbow trout, Trout, *Fish behavior.

About 90% of the S. gairdneri roaming freely in a large pond were conditioned to come to feed at the source of an underwater acoustic stimulus in about 45 trials. The stimulus was a 150-Hz, pure tone broadcasted continuously for 1 min before and throughout feeding. The fish showed no tendency to discriminate between the conditioning tone and a 300-Hz tone produced in tests from the same sound source.—Copyright 1972, Biological Abstracts. Inc.

FURTHER ULTRASONIC TRACKING AND TAGGING STUDIES ON HOMING
CUTTHROAT TROUT (SALMO CLARKI) IN
YELLOWSTONE LAKE,
Maine Univ., Orono. Dept. of Zoology.
For primary bibliographic entry see Field 02H.

W73-02577

SIMULATION STUDIES OF THE ADAMS RIVER SOCKEYE SALMON (ONCOR-HYNCHUS NERKA), British Columbia Univ., Vancouver. Inst. of Animal Resources and Ecology.

P. A. Larkin J Fish Res Board Can. Vol 28, No 10, p 1493-1502,

1971. Illus. 1971. inus. Identifiers: *Adams River, *Canada, Fluctuation, Oncorhynchus-Nerka, Fish populations, Preda-tion, Rivers, Salmon, *Simulation studies, *Sockeye salmon, Type, Year.

The pattern of abundance of O. nerka of the Adams River since 1938 is: 1 yr larger or 'domi-nant,' 1 yr small or 'subdominant,' and 2 yr very small or 'off.' In recent years, the subdominant run has shown indications of becoming as large as the dominant. This pattern can be accounted for by a model system in which predation is not sufficient to influence the dominant run, but predators, benefited by the abundance of prey, remove such a large fraction in the 3 succeeding yr that the pat-tern is retained. Buffering of predation by the dominant run accounts for the larger size of the subdominant. Patterns similar in form to those obsubdominant. Patterns similar in form to those ob-served naturally since 1922 are produced over a narrow range of parameters, and suggest that the particular circumstances of the Adams run are necessary to the nature of the population fluctua-tion, but are not so particular that some other pat-tern could not have emerged with different sequence of environmental conditions. Taking an array of results of a series of simulations suggests that the odds of developing the existing nattern array of results of a series of simulations suggests that the odds of developing the existing pattern were about 50:50, although the subdominant run would more commonly become dominant as well by 1951, rather than as late as the 1960's. The double dominance situation is stable in the model system. In the present circumstances it seems appropriate to explore the possible benefits of managing the fishery so as to enhance the growth

in size of the subdominant run, and perhaps to consider predator-removal programs to enable development of large runs on all 4 yr of the traditional cycle.—Copyright 1972, Biological Abstracts, Inc. W73-02580

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition AND Processing

A DICTIONARY OF HYDROGEOLOGY AND ENGINEERING GEOLOGY (SLOVAR' PO GIDROGEOLOGII I INZHENERNOY

GEOLOGIII, All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow Hydrogeology and Language (USSR).
A. A. Makkaveyev.
Izdatel'stvo 'Nedra', Moscow, 1971. 216 p.

Descriptors: *Publications, *Documentation, *Data collections, *Hydrogeology, *Engineering geology, Groundwater, Geology, Hydrology, Water chemistry, Geochemistry, Soil mechanics. Identifiers: *USSR, *Dictionaries.

This edition updates and revises the first edition of a dictionary of hydrogeology and engineering geology first published in 1961 by the State Scien-tific and Technical Publishing House of Petroleum and Mineral Fuel Literature (Gostoptekhizdat). The dictionary contains a large number of terms drawn from geology, hydrology, hydrochemistry, geochemistry, soil mechanics, etc. The terms are defined in relation to their use in hydrogeology and engineering geology. (Josefson-USGS) W73-02064.

10B. Reference and Retrieval

EVALUATION OF SELECTED ASPECTS OF COMMUNICATION OF WATER RESOURCES RESEARCH INFORMATION AMONG UNIVER-SITY RESEARCHERS AND USERS, North Carolina State Univ., Raleigh. Dept. of Adult and Community College Education. For primary bibliographic entry see Field 06B.

10C. Secondary Publication AND Distribution

BIBLIOGRAPHY ON THE HYDROGEOLOGY OF SIBERIA AND THE SOVIET FAR EAST FOR THE PERIOD 1918-1965 (GIDROGEOLOGIYA SIBIRI I DAL'NEGO VOSTOKA. BIBLIOGRAFICHESKIY UKAZATEL'. 1918-

-1-3-0), Institut Zemnoi Kory, Irkutsk (USSR). For primary bibliographic entry see Field 02F. W73-02058

BIBLIOGRAPHY OF REMOTE SENSING FOR PLANNING AND ADMINISTRATIVE STUDIES, Oklahoma Univ., Norman. For primary bibliographic entry see Field 07B. W73-02305

SUMMARY OF CURRENT RESEARCH ON SNOW AND ICE IN CANADA.
National Research Council of Canada, Ottawa (Ontario). Associate Committee on Geotechnical For primary bibliographic entry see Field 02C. W73-02310

Field 10—SCIENTIFIC AND TECHNICAL INFORMATION Group 10C—Secondary Publication and Distribution

ANNOTATED BIBLIOGRAPHY OF LAKE ON-TARIO LIMNOLOGICAL AND RELATED STU-DIES. I. - CHEMISTRY, State Univ., Coll., Buffalo, N.Y. Great Lakes Lab. For primary bibliographic entry see Field 05C. W73-02443

CONTROL OF AQUATIC VEGETATION IN FRESHWATER,
Department of the Interior, Washington, D.C. Office of Library Services.
For primary bibliographic entry see Field 04A.
W73-02444

10F. Preparation of Reviews

ECOLOGICAL EFFECTS OF OFFSHORE CONSTRUCTION, Marine Science Inst., Bayou La Batre, Ala. For primary bibliographic entry see Field 05C. W73-02029 Compa Fir Fo Area (S W73-02

The Or Contem W73-02

ABSORP1 The We 1971. II W73-02

Effects Regulat W73-02 DDT R ton and W73-02

Water a Waste, W73-02

Separati Adsorpt W73-02: Solar R

wood Fo W73-02: ABSTRAC Bibliogr

ACCELES Hills Cr W73-020

ACCRETI Mather Islands i W73-025

ACOUSTIC Cement Complet W73-023

ACOUSTIC Induced Trout (S ditioning W73-025

The Use Sandstor W73-024

Vienna-I W73-021

Practical trolytes, W73-022

A Metho Sewage I Demand, W73-022

A Statist trolytes, Sludge S W73-0222

SUBJECT INDEX

| AARGAU MOUNTAINS Comparative Ecologic Investigation on Plateau | Mechanisms of Change in Activated Studge De- waterability During Aerobic Digestion, | Procedures for Evaluation of Water and R lated Land Resource Projects. |
|---|--|--|
| Fir Forest in the Western Aargau Mountain Area (Switzerland), (In German), | W73-02362 5D | W73-02271 6 |
| W73-02056 4A | Resistance of Carcinogenic Organic Com- pounds to Oxidation by Activated Sludge, | Summary of Current Research on Snow as Ice in Canada. |
| ABLATION | W73-02535 SD | W73-02310 2 |
| The Origin of Fluted Moraine at the Fronts of | | 1175 02510 |
| Contemporary Glaciers, | Anion Exchange and Filtration Techniques for | ADMINISTRATIVE LAW |
| W73-02045 2J | Wastewater Renovation, | Courts and Water, The Role of the Judici |
| ABSORPTION | W73-02537 5D | Process, |
| The West Falmouth Oil Spill. Data Available in | Modeling and Optimization of a Tower-Type | W73-02365 |
| 1971. II. Chemistry, | Activated Sludge System, | ADOPTION OF PRACTICES |
| W73-02024 5C | W73-02553 5D | Report to the Water Resources Council by the |
| Effects of Temperature on Osmotic and Ionic | ACTIVATION ENERGY | Special Task Force, Findings and Recomme |
| Regulation in Goldfish, | A Regulatory Mechanism for CO2 Assimilation | dutions. W73-02232 |
| W73-02103 5C | in Plant Photosynthesis: Activation of Ribu- | # 13-02232 |
| DDT Residues in Coastal Marine Phytoplank- | lose-1,5-Diphosphate Carboxylase by Fructose | ADSORPTION |
| ton and Their Transfer in Pelagic Food Chains, | 6-Phosphate and Deactivation by Fructose 1,6- | The Effects of Divalent Metal Ions on the |
| W73-02105 5C | Diphosphate, | Micellar Properties of Sodium Dodecyl Sulfat |
| Water and Campas Chidas Absoration by Galid | W73-02474 5C | W73-02557 |
| Water and Sewage Sludge Absorption by Solid Waste, | ADAMS RIVER | |
| W73-02191 5D | Simulation Studies of the Adams River | AERATION |
| 117-02171 | Sockeye Salmon (Oncorhynchus nerka), | Hydraulic Model Studies of Scoggins Dam Fi |
| Separation of Lignin from Aqueous Solution by | W73-02580 81 | Trap Aerator and Supply Structure, W73-02069 |
| Adsorptive Bubble Separation Processes, | 117-02500 | W 73-02009 |
| W73-02350 5D | ADENOSINE TRIPHOSPHATE | Hypolimnion Aeration, |
| Solar Radiation Absorption by Leafless Hard- | Relation Between Anaerobic ATP Synthesis | W73-02137 |
| wood Forests, | from Pyruvate and Nitrogen Fixation in | |
| W73-02569 2I | Azotobacter vinelandii, | Vienna-Blumental Sewage Treatment Plant, |
| - | W73-02475 5C | W73-02197 |
| ABSTRACTS | ADITOGON | Industrial Wests and the Small City |
| Bibliography of Remote Sensing for Planning | ADHESION The Adhesive Properties of Chlorella Vulgaris, | Industrial Waste and the Small City. W73-02214 |
| and Administrative Studies, W73-02305 7B | and the Enhancement of This Adhesion by | W /3-02214 |
| W73-02305 7B | Substances Found in Ambient Sea Water, | AERIAL PHOTOGRAPHY |
| ACCELERATED EROSIN | W73-02470 5C | Ice-Cored Moraines in Southern British Colu |
| Hills Creek Reservoir Turbidity Study, | | bia and Alberta, Canada, |
| W73-02092 5C | ADJUDICATION PROCEDURE | W73-02042 |
| ACCRETION (LEGAL ASPECTS) | In Re Johnson Orchards and Farms, Inc. (Ju- | |
| Mather V. State (Ownership of Accretion to | risdiction of Department of Environmental | Proposed Experimental Programs for Testi |
| Islands in a Navigable Stream). | Conservation over Accidental Discharge of | Remote Sensor Applications in t Metropolitan Washington Area, |
| W73-02532 6E | Chemicals in State Waterway). W73-02246 6E | W73-02491 |
| | W73-02246 6E | 17.00.00 |
| ACOUSTIC LOGGING | ADMINISTRATION | AEROBIC CONDITIONS |
| Cement Bond Logging, an Aid to Better Completion Practices, | Sierra Club V. Froehlke (Judicial Review of | Kinetics of Bacterial Growth During Aerol |
| W73-02385 8F | Environmental Impact Statement). | Oxidation of Organics, |
| | W73-02238 6E | W73-02449 |
| ACOUSTIC STIMULUS | | Kinetics of Biologically Mediated Aerobic O |
| Induced Aggregation of Pond-Reared Rainbow | Authorization and Appropriation Processes for | idation of Organic Compounds in Receivi |
| Trout (Salmo gairdneri) Through Acoustic Con- | Water Resource Development, W73-02364 6E | Waters and in Waste Treatment, |
| ditioning, W73-02576 81 | W73-02364 6E | W73-02450 |
| W /3-023/6 | Conference Report on the Federal Water Pollu- | |
| ACOUSTICS | tion Control Act Amendments of 1972, | AEROBIC DIGESTION |
| The Use of Acoustic Logs in the Evaluation of | W73-02530 5G | Mechanisms of Change in Activated Sludge I |
| Sandstone Reservoirs, | | waterability During Aerobic Digestion, |
| W73-02401 8G | ADMINISTRATIVE AGENCIES | W73-02362 |
| ACTIVATED SLUDGE | Water Quality Management, An Analysis of In- stitutional Patterns, | AEROBIC OXYDATION |
| Vienna-Blumental Sewage Treatment Plant, | W73-01978 5G | Kinetics of Biologically Mediated Aerobic C |
| W73-02197 5D | #75-01576 | idation of Organic Compounds in Receivi |
| | In Re Johnson Orchards and Farms, Inc. (Ju- | Waters and in Waste Treatment, |
| Practical Experience in the use of Polyelec- | risdiction of Department of Environmental | W73-02450 |
| trolytes, W73-02203 5D | Conservation over Accidental Discharge of | 4.00 |
| H 13-04203 | Chemicals in State Waterway). | AGE |
| A Method for Isolating Suspended Solids from | W73-02246 6E | Age, Growth, and Downstream Migration |
| Sewage Effluents for Measurement of Oxygen | Project Management for Board Compt. | Juvenile Rainbow Trout (Salmo gairdneri) ir |
| Demand, | Environmental Management for Puget Sound: | Lake Michigan Tributary, W73-02574 |
| W73-02207 5D | Certain Problems of Political Organization and Alternative Approaches, | TI 13-023/4 |
| A Statistical Study of The Effects of Polyelec- | W73-02251 6E | AGGLOMERATION (TURBIDITY) |
| trolytes, Mixing and pH Upon an Activated | | Applications of Agglomerate Testing |
| Sludge System, | Clean Rhetoric and Dirty Water, | Problems in Water Resources Management, |
| 11/72 02221 ED | W73_02260 6F | W73_01965 |

| Access of the second se |
|--|
| AGGREGATION |
| Induced Aggregation of Pond-Reared Rainbow |
| Trout (Salmo gairdneri) Through Acoustic Con- |
| ditioning, |
| W73-02576 |
| AGING (PHYSICAL) |
| The West Falmouth Oil Spill. Data Available in |
| 1971. II. Chemistry, |
| W73-02024 5C |
| |
| AGRIBUSINESS Irrigation Management-A Tool for Agribusi- |
| ness, |
| W73-02546 3F |
| |
| AGUADILLA-AGUADA AREA (P R) |
| Floods in the Aguadilla-Aguada Area, |
| Northwestern Puerto Rico, W73-02327 7C |
| W 13-02321 |
| AIR DRILLING |
| Volume Requirements for Air or Gas Drilling, |
| W73-02381 8B |
| A PRI PERSONA A SACRASSIANO |
| AIR ENTRAINMENT Hydraulic Model Studies of Scoggins Dam Fish |
| Trap Aerator and Supply Structure, |
| W73-02069 81 |
| |
| AIR POLLUTION |
| Power, Pollution, and Public Policy, Issues in |
| Electric Power Production, Shoreline Recrea- |
| tion, and Air and Water Pollution Facing New England and the Nation. |
| W73-02299 6G |
| |
| AIR-WATER INTERFACES |
| The Coastal Boundary Layers of a Lake, |
| W73-02508 2H |
| The Effects of Divalent Metal Ions on the |
| Micellar Properties of Sodium Dodecyl Sulfate, |
| W73-02557 2K |
| APPAY A PROPERTY AND MARCHE |
| AKDALA IRRIGATED MASSIF |
| Soil Amelioration Conditions in the Akdala Ir- rigated Massif (On the Example of the Bakh- |
| bakhta Rice Growing Sovkhoz) (In Russian), |
| W73-02184 3F |
| |
| ALABAMA |
| Description of Alabama Estuarine Areas- Cooperative Gulf of Mexico Estuarine Invento- |
| ry, |
| W73-02037 2L |
| |
| Dredging and Filling, Cowikeee State Park, |
| Lakepoint Resort, Walter F. George Lake, |
| Chattahoochee River, Alabama (Draft Environ- mental Statement). |
| W73-02233 4A |
| HEALTHANN SHIPE |
| ALASKA |
| Small Boat Harbor Project, Bethel, Alaska |
| (Final Environmental Impact Statement). W73-02264 4A |
| W73-02264 4A |
| Rotary Drilling and Coring in Permafrost: Part |
| III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, |
| Bore Hole Thermometry at Cape Thompson, |
| Alaska, |
| W73-02312 8B |
| ALBANY COUNTY (N Y) |
| |

| AGGREGATION Induced Aggregation of Pond-Reared Rainbow | |
|---|---|
| Trout (Salmo gairdneri) Through Acoustic Conditioning, | |
| W73-02576 | |
| AGING (PHYSICAL) The West Falmouth Oil Spill. Data Available in 1971. II. Chemistry, | |
| W73-02024 5C | |
| AGRIBUSINESS | |
| Irrigation ManagementA Tool for Agribusi- ness, | |
| W73-02546 3F | |
| AGUADILLA-AGUADA AREA (P R) Floods in the Aguadilla-Aguada Area, | |
| Northwestern Puerto Rico, W73-02327 7C | |
| AIR DRILLING | |
| Volume Requirements for Air or Gas Drilling, W73-02381 8B | |
| AIR ENTRAINMENT | |
| Hydraulic Model Studies of Scoggins Dam Fish | |
| Trap Aerator and Supply Structure, W73-02069 | 1 |
| AIR POLLUTION | |
| Power, Pollution, and Public Policy, Issues in | |
| Electric Power Production, Shoreline Recrea- tion, and Air and Water Pollution Facing New | |
| England and the Nation. W73-02299 6G | |
| AIR-WATER INTERFACES | |
| The Coastal Boundary Layers of a Lake, W73-02508 2H | 1 |
| The Effects of Divalent Metal Ions on the | |
| Micellar Properties of Sodium Dodecyl Sulfate, W73-02557 2K | |
| AKDALA IRRIGATED MASSIF | |
| Soil Amelioration Conditions in the Akdala Ir- rigated Massif (On the Example of the Bakh- bakhta Rice Growing Sovkhoz) (In Russian), | |
| W73-02184 3F | |
| ALABAMA Description of Alabama Estuarine Areas- | |
| Cooperative Gulf of Mexico Estuarine Inventory, | |
| Ŵ73-02037 2L | |
| Dredging and Filling, Cowikeee State Park | |
| Lakepoint Resort, Walter F. George Lake, Chattahoochee River, Alabama (Draft Environ- | |
| mental Statement). W73-02233 | |
| ALASKA | |
| Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). | |
| W73-02264 4A | |
| Rotary Drilling and Coring in Permafrost: Par III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, | 1 |
| Alaska, W73-02312 | |
| ALBANY COUNTY (N Y) | |
| Low-Flow Study of Streams in Albany County, | |
| New York, W73-02318 70 | |

| AGGREGATION |
|---|
| AGGREGATION Induced Aggregation of Pond-Reared Rainbow Trout (Salmo gairdneri) Through Acoustic Con- |
| ditioning, W73-02576 8I |
| AGING (PHYSICAL) The West Falmouth Oil Spill. Data Available in 1971. II. Chemistry, |
| W73-02024 5C |
| AGRIBUSINESS Irrigation Management—A Tool for Agribusi- ness, W73-02546 3F |
| W73-02546 3F AGUADILLA-AGUADA AREA (P R) |
| Floods in the Aguadilla-Aguada Area, Northwestern Puerto Rico, |
| W73-02327 7C |
| Volume Requirements for Air or Gas Drilling, W73-02381 |
| AIR ENTRAINMENT Hydraulic Model Studies of Scoggins Dam Fish |
| Trap Aerator and Supply Structure, W73-02069 81 |
| AIR POLLUTION |
| Power, Pollution, and Public Policy, Issues in Electric Power Production, Shoreline Recrea- tion, and Air and Water Pollution Facing New |
| England and the Nation. W73-02299 6G |
| AIR-WATER INTERFACES The Coastal Boundary Layers of a Lake, W73-02508 2H |
| The Effects of Divalent Metal Ions on the Micellar Properties of Sodium Dodecyl Sulfate, W73-02557 2K |
| AKDALA IRRIGATED MASSIF Soil Amelioration Conditions in the Akdala Ir- rigated Massif (On the Example of the Bakh- bakhta Rice Growing Sovkhoz) (In Russian), W73-02184 |
| ALABAMA Description of Alabama Estuarine Areas— Cooperative Gulf of Mexico Estuarine Invento- |
| ry, W73-02037 2L |
| Dredging and Filling, Cowikeee State Park, Lakepoint Resort, Walter F. George Lake, Chattahoochee River, Alabama (Draft Environ- mental Statement). W73-02233 4A |
| ALASKA |
| Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). W73-02264 4A |
| Rotary Drilling and Coring in Permafrost: Part III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, Alaska, |
| W73-02312 8B |
| ALBANY COUNTY (N Y) Low-Flow Study of Streams in Albany County, New York, |

| ALBEDO Solar Radiation Absorption by Leafless Hardwood Forests, W73-02569 2I ALBERTA (CANADA) Maintenance of Water Quality-Alberta's Legislative Scheme and the Common Law, W73-02525 SG ALEWIVES Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, W73-02578 2H ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 3F ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 SG Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 SC The Impact of Reduced Light Penetration on a | | |
|---|--|--|
| Solar Radiation Absorption by Leafless Hardwood Forests, W73-02569 2I ALBERTA (CANADA) Maintenance of Water Quality-Alberta's Legislative Scheme and the Common Law, W73-02525 5G ALEWIVES Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, W73-02578 2H ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 3F ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | SUBJECT INDEX | |
| ALBERTA (CANADA) Maintenance of Water Quality-Alberta's Legislative Scheme and the Common Law, W73-02525 SG ALEWIVES Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, W73-02578 2H ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 3F ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 What's it all About. Algae, W73-02187 SG Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | Solar Radiation Absorption by Leafless Hard- | |
| Maintenance of Water Quality-Alberta's Legislative Scheme and the Common Law, W73-02525 5G ALEWIVES Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, W73-02578 2H ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 3F ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | W73-02569 2I | |
| Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, W73-02578 2H ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 3F ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | Maintenance of Water Quality-Alberta's Legislative Scheme and the Common Law, | |
| The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), W73-01997 ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | Utilization of Alewives by Inshore Piscivorous Fishes in Lake Michigan, | |
| ALGAE Studies on Algal Growth, Development, and Reproduction, W73-02099 5C Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | ALFALFA The Effect of Fertilizers on Seed Production of Irrigated Alfalfa. (In Ukrainian), | |
| with Synthetic Complexing Agents and Detergent Phosphate Substitutes in Aquatic Systems, W73-02112 5A What's it all About. Algae, W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | ALGAE Studies on Algal Growth, Development, and Reproduction, | |
| W73-02187 5G Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | with Synthetic Complexing Agents and Deter- gent Phosphate Substitutes in Aquatic Systems, | |
| with Respect to Intensity and Nitrogen Concentration, W73-02218 5C | | |
| COUNTY ENGLISHED IN ASSESSMENT PRINCIPLE 6/71 | with Respect to Intensity and Nitrogen Concentration, | |
| The Impact of Reduced Light Penetration on a | THE ALLERTON PROCESS OF CORNEL AND | |
| Eutrophic Farm Pond, W73-02349 5C | | |
| Kenosha Increases Plant Capacity with Micros- | Kenosha Increases Plant Capacity with Micros- | |
| trainers, W73-02426 5F | | |
| Characterization of Phenols in Areas of Water 'Blooming' in Open Bodies of Water, | 'Blooming' in Open Bodies of Water, | |
| W73-02460 5C Multivariate Approaches to Algal Strategies | The state of the s | |

| Eutrophic Farm Por W73-02349 | nd, | 5C |
|---------------------------------|----------------|--------------|
| Kenosha Increases trainers. | Plant Capacity | with Micros- |
| W73-02426 | | 5F |
| Chamataniantian of | Dhamala in A | man of Water |

| Multivariate | | | | | | |
|-----------------------------|-------|----------|-------|--------|---------|-----|
| and Tactics Phytoplankto | | the S | yster | ns A | nalysis | |
| W73-02469 | | | | | | 5C |
| Algal Nitroge | n Fix | ation in | Ten | nperat | e Regio | ns, |

| W73-02471 | 5C |
|--|----|
| Algal Nitrogen Fixation in the Tropics, W73-02473 | 5C |

| | Salinity-Related Polymorphism in the | Brackish |
|---|--------------------------------------|----------|
| | Water Diatom Cyclotella Cryptica, | |
| 1 | W73-02548 | 50 |

| Comparative | Study o | f the Ecology | of Fre | ee-Liv |
|---------------------------|---------|---------------|--------|--------|
| | | Rugozersky | Inlet | (Kan |
| dalaksha Bay W73-02585 | , White | Sea), | | 50 |

| ALGAE BIOMASS Kinetics of Algal Biomass Production S with Respect to Intensity and Nitrogen G | |
|--|----|
| tration, W73-02218 | 5C |

ALGAL CULTURES Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Deter-gent Phosphate Substitutes in Aquatic Systems, W73-02112 5A

| ALGORITHMS |
|--|
| Modeling and Sensitivity Analysis for Planning |
| Decisions in Water Resources Expansion, |
| W73-02541 4A |

| ì | ALLUV | IAL CHAP | NNEL | S | | |
|---|-------|-------------|------|------------|--------------|------|
| | Bedfo | orms of the | Tan | a River, N | lorway, | |
| | W73-0 | 2047 | | | spirit of | 2C |
| | Wield | Manning | and | Compute | r Simulation | n of |

| Field | Mapping | and | Computer | Simulation | of |
|----------------|--------------------|------|----------|------------|-----|
| Braid W73-6 | ed-Stream 02490 | Netv | vorks, | | 2,1 |

| A Random-Walk | Simulation | Model | of | Alluvial |
|------------------------------|------------|-------|----|----------|
| Fan Deposition, W73-02342 | 3 | | | 2J |
| ALLUVIAL FANS | | | | |

| Some | timentolog | ical A | spects | of | the | Flu- |
|-------|----------------------|--------|--------|----|------|-------|
| | Outwash erlands), | Plain | Near | So | este | rberg |
| W73-0 | | | | | | 2J |

| A Contribution to the Sedimentary | Pe | trological |
|---|----|------------|
| Description of the Maas Deposits | in | Southern |
| Limburg (The Netherlands), W73-02153 | | 21 |

| Some Sedimentolog | ical A | spects | of | the | Flu- |
|---------------------------------------|--------|--------|----|------|-------|
| vioglacial Outwash (The Netherlands). | Plain | Near | So | este | rberg |
| W73-02159 | | | | | 2J |

| Wisconsin Boulder Flow and Its Geomor | phic |
|---------------------------------------|------|
| Implications, Franklin Mountains, El | Pasc |
| County, Texas, W73-02487 | 21 |

| ALOPECURUS-PRATENSIS-M | |
|---|-----|
| Vegetation of the Area of the Future Reserv | oir |
| on the Klenovska Rimava, | |
| W73-02087 | 21 |

| ALPHANUMERIC MAI | PINFURMATION |
|--|-------------------------|
| An Analysis of Fore | ested Watershed Land of |
| the Cape Fear River | Basin Using a Computer- |
| Oriented Alphanume sembly and Display S | ric Map Information As- |
| W73-02358 | 70 |

| ALPINE | | | | | | |
|----------------|------|----|----------|-------|-------|---|
| Frost Cracking | in t | he | Colorado | Front | Range | , |

| ALPY | LBENZENE SULI | FONATES |
|-------|--------------------|---------------------------|
| Ren | noval of Toxic Per | sticides by Reverse Osmo- |
| sis ' | Water Treatment, | |
| W7. | 3-02222 | 5D |

| ALTERNATIVE FUTURES | Water | | Y | - |
|---|-------|-----|------|-----|
| Alternative Demands for Agricultural Purposes, | water | and | Land | ior |
| W73-02363 | | | | 6D |
| ALTERNATIVE PLANNING | | | | |

| Alternative Adjustment | s to Nati | urai Haza | rds, |
|------------------------|-----------|-----------|------|
| W73-02367 | | | 6F |
| Water Economics, | | | |
| W73-02543 | * | , | 4B |

| | Creek | | | Creek, | Scioto | Rive |
|---------------------------|--------|------|-------|--------|---------|--------------|
| Basin, Staten W73-0 | nent). | (Dra | ft Er | vironm | ental 1 | impaci 8A |

| Structura W73-023 | |
|--|---|
| AMINO AG The Infle Cooling Plants, W73-019 | - |

| AM | MC | NI | A |
|----|------|------|---|
| I | nve | stig | a |
| | hyt | | |
| | inia | | |
| | V73 | | |
| | | 87 | |
| AM | ST | ERI | D |

| Hydrob Island: W73-02: | 15 |
|---------------------------------|----|
| ANADRO: Effects | (|
| Require Saxatilis W73-024 | s, |

| AMBIENT ENVIRONMENT | Neutron Activation Analysis of WaterA | ANTARCTIC |
|--|---|--|
| The Ambient Environment of Lichens as a | Review, | Circulation and Hydrology Under the Seasonal |
| Function of Exterior Atmospheric Conditions | W73-02166 5A | Ice in McMurdo Sound, Antarctica, |
| Existing in the Locality, W73-02290 2I | Laboratory Methods for the Measurement of | W73-02051 2C |
| AMIDE-WATER MIXTURES | Pollutants in Water and Waste Effluents, W73-02167 5A | Reworked Palynomorphs from the West Ice |
| Structural Aspects of Amide-Water Systems, | W73-02167 5A | Shelf Area, East Antarctica, and Their Possible Geological and Palaeoclimatological Sig- |
| W73-02343 5A | Time Stability of Aqueous APDC and Its Man- | nificance. |
| AME CA | ganese and Nickel Complexes in MIBK, | W73-02495 2J |
| AMIDES | W73-02320 2K | A CONTRACTOR OF THE PROPERTY O |
| Structural Aspects of Amide-Water Systems, W73-02343 5A | Radioisotope Investigation Techniques in En- | On the Use of Stable Isotopes to Trace the |
| W15-02545 | gineering Geology and Hydrogeology | Origins of Ice in a Floating Ice Tongue, |
| AMINO ACIDS | (Radioizotopnyye metody issledovaniya v inz- | W73-02168 2C |
| The Influence of a Short Period of Evaporative | henernoy geologii i gidrogeologii), | CARCA PRICE PROPERTY. |
| Cooling on the Distribution of 14C in Potato Plants, | W73-02328 8G | APDC/MIBK METHOD Time Stability of Aqueous APDC and Its Man- |
| W73-01969 3F | Analysis of Residual Total Nitrogen in Waste- | ganese and Nickel Complexes in MIBK, |
| | waters, | W73-02320 2K |
| Chemical Responses by Marine Organisms to | W73-02345 5A | I WHI I WHAT WHAT |
| Stress, Stress in Hard Clams from a Polluted Estuary, | An Analysis of Forested Watershed Land of | APHANIZOMENON Water Quality of Hyrum Lake and Its Relation- |
| W73-01975 5C | the Cape Fear River Basin Using a Computer- | ship to Algal Blooms, |
| and the control of th | Oriented Alphanumeric Map Information As- | W73-02121 5C |
| Structural Aspects of Amide-Water Systems, | sembly and Display System, | |
| W73-02343 5A | W73-02358 7C | APPARENT MOLAR VOLUMES |
| AMMONIA | The Analytical Control of Anti-Corrosion | Structural Aspects of Amide-Water Systems, W73-02343 5A |
| Investigations on Nutrient Factors Limiting | Water Treatment, | W 13-02343 |
| Phytoplankton Productivity in Two Central Vir- | W73-02411 5F | APPLE-D |
| ginia Ponds, | Chemical Aspects of Bioassay Techniques for | Frosthardiness of Apple Trees Scored Accord- |
| W73-02452 5C | Establishing Water Quality Criteria, | ing to the Water Retention Ability of Leaves (In Czechoslovakian), |
| AMSTERDAM ISLAND | W73-02446 5A | W73-02164 2D |
| Hydrobiological Research on Amsterdam | | |
| Island: 1969-1970 Exploratory Campaign, | Oxidation-Reduction Potentials, Oxygen Con- | APPLICATION EQUIPMENT |
| W73-02582 2I | centration and Oxygen Uptake of Profundal Sediments in a Eutrophic Lake, | Pump Application Engineering, |
| ANADROMOUS FISH | W73-02451 5C | W73-02414 8C |
| Effects of Handling and Salinity on Oxygen | | APPROPRIATION |
| Requirements of the Striped Bass, Morone | The Potential of Physical Models to Investigate | Authorization and Appropriation Processes for |
| Saxatilis, | Estuarine Water Quality Problems, W73-02455 5C | Water Resource Development, |
| W73-02435 5C | W 73-02433 | W73-02364 6E |
| ANALINE DYE | Multivariate Approaches to Algal Strategies | AQUATIC ANIMALS |
| The Impact of Reduced Light Penetration on a | and Tactics in the Systems Analysis of | Pesticides and Freshwater Fauna, |
| Eutrophic Farm Pond, | Phytoplankton, W73-02469 5C | W73-02098 5B |
| W73-02349 5C | W 73-02409 | AQUATIC ENVIRONMENT |
| ANALOG MODELS | ANCHORAGE | The Structure and Function of Fresh-Water |
| Filtrate Invasion in Highly Permeable Sands, | Bucks Harbor, Machiasport, Maine (Final En- | Microbial Communities. |
| W73-02422 8B | vironmental Impact Statement). W73-02234 8A | W73-02095 5C |
| ANALOG RECORDINGS | W73-02234 8A | A Survey of the Benthic Macroinvertebrate |
| Seismic Profiling and Geology of the Toronto | ANIMAL POPULATIONS | Populations in the New Hope and Lower Haw |
| Waterfront Area of Lake Ontario, | Comparison of Benthic Infaunal Abundance on | Rivers, |
| W73-02501 2H | Two Abyssal Plains in the Northeast Pacific | W73-02355 5B |
| ANALYTICAL TECHNIQUES | Ocean with Comments on Deep-Sea Food Sources. | Heavy Metal Analyses of Freshwater Macroin- |
| Determination of Trace Metal Pollutants in | W73-02017 5A | vertebrates from the Lower Haw and New |
| Water Resources and Sediments. | | Hope Rivers, |
| W73-01958 5A | The Effect of Water Level Fluctuations on a Littoral Fauna. | W73-02356 5A |
| THE RESERVE AS A STATE OF THE S | Littoral Pauna, W73-02477 5C | AQUATIC INSECTS |
| The West Falmouth Oil Spill. Data Available in 1971. II. Chemistry, | | Aquatic Insects of the Pine-Popple River, |
| W73-02024 5C | ANION EXCHANGE | Wisconsin, |
| All the second s | Wastewater Treatment by Ion Exchange, | W73-02097 5C |
| An Estimate of Primary Productivity in a | W73-02202 5D | AQUATIC INVERTEBRATES |
| Pennsylvania Trout Stream Using a Diurnal Oxygen Curve Technique, | Anion Exchange Equilibria Involving | A Polypropylene Light Trap for Aquatic Inver- |
| W73-02030 5A | Phosphate, Sulphate and Chloride, | tebrates, |
| | W73-02208 5D | W73-02458 7B |
| Pesticides and Freshwater Fauna, | ANISOTROPY | AQUATIC LIFE |
| W73-02098 5B | A Fracture Criterion for Brittle Anisotropic | Pesticide-Induced Stress Profiles, |
| Measurement of Low Turbidities, | Rock, | W73-02274 5C |
| W73-02147 5A | W73-02397 8E | AQUATIC MICROORGANISMS |
| A Quantitative Evaluation of Dissolved Oxygen | ANNULAR VELOCITY | The Structure and Function of Fresh-Water |
| Instrumentation, | Volume Requirements for Air or Gas Drilling, | Microbial Communities. |
| W73-02165 5B | W73-02381 8B | W73-02095 5C |
| | | |

SUBJECT INDEX

BALTIC Investi with Se W73-02

BALTIM Baltime River vironm W73-02 BARGES Offshor W73-02 BARLEY Surviva Under 1 W73-02 BAROCL Transpo Near th Summe W73-02

BASE FL Rechary Nishnal W73-02 BASELIN Elemen W73-02 BASIC DA pilation 1952 to W73-02 Water I 2. Wate W73-02 BATHYM An A W73-02 Lake E Mohawi W73-02

BAY OF I Hydrau Migratio W73-02

BAY OF P Direct Associathe Bay W73-020

Estuarie Puerto I W73-019 BEACH E National Report, W73-021

Public S.4018). W73-022

Hamlin

Erosion

AQUATIC MICROORGANISMS

| Significance of the Fecal Streptococci, | Model of Pressure Ridge Formation in Sea Ice, | AUSTRALIA |
|---|---|---|
| Coliform Bacteria and Coliphage in Relation- ship to Enteric Virus Pollution in Sewage and | W73-02172 2C | A Shallow Artesian Aquifer in the Tertiary Deposits of Southern Cape York Peninsula, |
| Rivers, | Meltwater Gaging Program Project No 1, Ap- proach Roads, Tuto Area, Greenland. | W73-02309 4B |
| W73-02119 5B | W73-02486 2C | Hydrologic Effects of a Bushfire in a |
| AQUATIC ORGANISMS | ADCOMMINA | Catchment in Southeastern New South Wales, |
| Water Quality Criteria Data Book - Volume 3: | ARGENTINA New Cases of Aquatic Epiphytes, (In Spanish), | W73-02589 4C |
| Effects of Chemicals on Aquatic Life, Selected Data from the Literature Through 1968. | W73-02551 2I | AUSTRIA |
| W73-01976 5C | ARID CLIMATES | Vienna-Blumental Sewage Treatment Plant, |
| AQUATIC PRODUCTIVITY | Reservoir Yield in Arid Regions with Limited | W73-02197 5D |
| The Structure and Function of Fresh-Water | Records, | Design Considerations for Large Treatment |
| Microbial Communities. | W73-02545 2A | Plants. W73-02213 5D |
| W73-02095 5C | ARIZONA | |
| QUATIC WEED CONTROL | Arizona Floods of September 5 and 6, 1970. W73-02325 2E | AUTOMATIC CONTROL |
| The White Amur for Aquatic Weed Control, | W73-02325 2E | Automated Separations in Routine Activation Analysis of Mercury. |
| W73-02010 4A | Groundwater Recharge and Quality Transfor- | W73-02015 5A |
| The Impact of Reduced Light Penetration on a | mations During Initiation of a New Sewage Sta- bilization Pond (and Management), | AUTOMATIC CONTROL OPERATIONS |
| Eutrophic Farm Pond, W73-02349 5C | W73-02438 5B | Measures of Organic Pollutants in Wastewater |
| | Geophysical, Geohydrological, and Geochemi- | Treatment Plant Operations, |
| Control of Aquatic Vegetation in Freshwater, | cal Reconnaissance of the Luke Salt Body, | W73-02334 5D |
| W73-02444 4A | Central Arizona, | AUTOMATION |
| Observations of Declining Water Lettuce Popu- | W73-02480 2F | The Economics of Automation in Wastewater |
| lations in Lake Izabal, Guatemala, W73-02549 2H | ARTESIAN AQUIFERS | Treatment, W73-02293 5D |
| | A Shallow Artesian Aquifer in the Tertiary | W 13-02253 |
| QUATIC WEEDS | Deposits of Southern Cape York Peninsula, W73-02309 4B | AVAILABLE WATER |
| Nutrient Removal by Waterhyacinth, W73-02122 5G | W 73-02309 | Determination of Moisture Supply and Cotton Yield in Uzbekistan, (In Russian), |
| | Finite Element Analysis of Flow Toward Arte- | W73-02008 3F |
| Control of Aquatic Vegetation in Freshwater, | sian Well, W73-02340 2F | AZOTOBACTER VINELANDII |
| W73-02444 4A | | Relation Between Anaerobic ATP Synthesis |
| QUEDUCTS | ARTESIAN WELLS A Shallow Artesian Aquifer in the Tertiary | from Pyruvate and Nitrogen Fixation in |
| The Undersea Aqueduct-A New Concept in Transportation. | Deposits of Southern Cape York Peninsula, | Azotobacter vinelandii, |
| W73-02076 8A | W73-02309 4B | W73-02475 5C |
| AQUEOUS SOLUTIONS | ARTIFICIALLY DENUDED AREA | BACTERIA |
| Studies on Reverse Osmosis for Water Pollu- | Taxonomy of North Shore Periphyton, Lake | Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, |
| tion Control, | Superior, Castle Danger Studies 1970-1971, W73-02555 SC | W73-02449 5C |
| W73-02225 5D | | Experiences with Wastewater Disinfection in |
| Time Stability of Aqueous APDC and Its Man- | ASH-FREE BIOMASS | California, |
| ganese and Nickel Complexes in MIBK, | Pollution and the Ecology of Nearshore Periphyton of Lake Superior: The Effects of | W73-02539 5D |
| W73-02320 2K | Calefaction on Periphyton, | Quantitative Description of the Initial Links of |
| Structural Aspects of Amide-Water Systems, | W73-02556 5C | the Production Process in the Shallow-Water |
| W73-02343 5A | ASPEN D | Bays of the Posiet Bau (Japanses Sea), (In Rus- |
| QUIFER CHARACTERISTICS | An Experiment in Modeling Rocky Mountain | sian), W73-02597 5C |
| Yields of Deep Sandstone Wells in orthern Il- | Forest Ecosystems, W73-02566 2A | |
| linois, W73-02386 3B | | BACTERIAL FLORA Aspects of the Characterization, Identification, |
| | ASPRO ZINGEL Morphological Characteristic of Aspro Zingel | and Ecology of the Bacterial Flora Associated |
| Yields of Shallow Dolomite Wells in Northern Illinois. | (L.) From the Lower Danube, (In Russian), | with the Surface of Stream-Incubating Pacific |
| W73-02399 4B | W73-01998 2I | Salmon (Oncorhynchus) Eggs, W73-02565 8I |
| Log Interpretations in Sandstone Reservoirs, | ATOMIC RATIOS | |
| W73-02423 4B | Standing Crops of Elements and Atomic Ratios | BACTERICIDES |
| Well I are in Corbonate Becompine | in a Small Mammal Community, W73-02584 5A | Effect of Lime-Treated Water Upon Survival of Bacteria, |
| Well Logs in Carbonate Reservoirs, W73-02424 4B | W73-02584 5A | W73-02148 5F |
| | ATTENUATION | BAIE DES CHALEURS |
| AQUIFER TESTING Hydraulics of Wells, | Sound Attenuation in Marine Sediments, W73-02467 2J | Quantitative Fluctuations in the Zooplankton of |
| W73-02378 8B | | the Baie-Des-Chaleurs (Saint-Lawrence Gulf): |
| | ATTITUDES Up and Down with EcologyThe 'Issue-Atten- | III. Fluctuations in Copepods Other Than Calanus, |
| Yields of Wells in Pennsylvanian and Mississip- pian Rocks in Illinois, | tion Cycle', | W73-02570 2L |
| W73-02400 4B | W73-02259 6G | |
| RCTIC | AUSTIN (TEX) | BALANCE OF NATURE Ecosystem Structure and Function. |
| Hydrometeorological Relationships and Their | Construction of Wastewater Facilities, Austin, | Proceedings of the Thirty-First Annual Biology |
| Effects on the Levees of a Small Arctic Delta, | Texas (Final Environmental Impact Statement). | Colloquium. |
| W73-02041 8D | W73-01980 5D | W73-02124 5C |

| BALTIC SEA Investigations on the Loading of the Untertrave with Sewage, (In German), | roe County, New York (Draft Environmental Impact Statement). W73-02261 | BETHEL (ALASKA) Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). |
|--|---|--|
| W73-02016 5C | | W73-02264 4A |
| BALTIMORE (MD) | Hawaii Regional Inventory of the National | BIBLIOGRAPHIES |
| Baltimore Harbor Outer Crossing (Patapsco | Shoreline Study. W73-02321 8B | Water Quality Criteria Data Book - Volume 3: |
| River Bridge) Baltimore, Maryland (Final En- | | Effects of Chemicals on Aquatic Life, Selected |
| vironmental Impact Statement). | BEACHES | Data from the Literature Through 1968. |
| W73-02518 8A | The Evolution of Coastal Sand Dunes, | W73-01976 5C |
| BARGES | W73-02035 2J | Bibliography on the Hydrogeology of Siberia |
| Offshore Siting of Electric Power Plants, | BEAN-D | and the Soviet Far East for the Period 1918- |
| W73-02301 6G | After Effect of Atmospheric Drought of | 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. |
| BARLEY-M | Coupling of Oxidation and Phosphorylation | Bibliograficheskiy ukazatel'. 1918-1965), |
| Survival and Leaching of Fecal Streptococci | Processes in the Leaves of Bean Plants with | W73-02058 2F |
| Under Field Conditions, | Different Drought-Resistance (In Russian), | Bibliography of Remote Sensing for Planning |
| W73-02143 5B | W73-02134 3F | and Administrative Studies, |
| BAROCLINIC COASTAL CURRENT | BED LOAD | W73-02305 7E |
| Transport in the Baroclinic Coastal Current | A General Stochastic Model for the Transport | Annotated Bibliography of Lake Ontario Lim- |
| Near the South Shore of Lake Ontario in Early | of Sediment Bed Material, | nological and Related Studies. I Chemistry, |
| Summer, | W73-02315 2J | W73-02443 50 |
| W73-02510 2H | | Control of Aquatic Vegetation in Freshwater, |
| BASE FLOW | BELGIUM | W73-02444 |
| Recharge to Ground Water from the West | Study of a Topo-Lithological Transect of the | |
| Nishnabotna River, | Eprave-Rochefort Surroundings (Lomme Val- ley, Southeast Belgium) to Delimitate the | BIOASSAY |
| W73-02033 4B | Forest Ecological Groups of the Calestienne, | Water Quality Criteria Data Book - Volume 3: |
| BASELINE STUDIES | W73-02294 4A | Effects of Chemicals on Aquatic Life, Selected Data from the Literature Through 1968. |
| Elemental Composition of the Estuarine | | W73-01976 50 |
| Teleost Fundulus Heteroclitus (L.), | The Ponds of the Soignes Forest, | |
| W73-02278 5C | W73-02593 4A | A Simple Apparatus for Measuring Activity |
| TIMO TIME CONTINUES | BELLINGHAM HARBOR (WASH.) | Patterns of Fishes, |
| BASIC DATA COLLECTIONS Crest-Stage Gaging Stations in Oregon-A Com- | A Study of Sediments from Bellingham Harbor | W73-01977 5A |
| pilation of Peak Data Collected from October | as Related to Marine Disposal, | DDT Residues in Coastal Marine Phytoplank |
| 1952 to September 1972, | W73-02461 5C | ton and Their Transfer in Pelagic Food Chains, |
| W73-02034 7C | | W73-02105 50 |
| Water Barrers Date for Galanda 1071, Bort | BELORUSSIA | Chemical Aspects of Bioassay Techniques for |
| Water Resources Data for Colorado, 1971: Part 2. Water Quality Records. | Problems in the Utilization and Conservation of Water Resources (Problemy ispol'zovaniya i | Establishing Water Quality Criteria, |
| W73-02039 2K | okhrany vodnykh resursov). | W73-02446 5A |
| | W73-02061 4A | BIOCHEMICAL OXYGEN DEMAND |
| BATHYMETRY Control of Determining | | Nonlinear Optimal Control Theory Applied to |
| An Automated System for Determining Estuarine Bathymetry, | BENTHIC FAUNA | Distributed Feed Biochemical River Reactor |
| W73-02317 7B | Comparison of Benthic Infaunal Abundance on | with Dual Water Quality and Self Purification |
| | Two Abyssal Plains in the Northeast Pacific Ocean with Comments on Deep-Sea Food | Restraints, |
| Lake Erie Nearshore Sediments-Fort Erie to | Sources. | W73-02352 50 |
| Mohawk Point, Ontario, W73-02504 2H | W73-02017 5A | BIOCHEMISTRY |
| W/3-02304 2H | | Relation Between Anaerobic ATP Synthesis |
| BAY OF FUNDY | Techniques for Sampling Benthic Organisms, | from Pyruvate and Nitrogen Fixation is |
| Hydraulic Parameters Controlling Bedform | W73-02019 7B | Azotobacter vinelandii, W73-02475 50 |
| Migration on an Intertidal Sand Body, W73-02489 2L | Comparative Investigations on the Benthic | H 13-02413 |
| 11 / 3 / 4 / 5 / 5 / 5 / 5 / 5 / 5 / 5 / 5 / 5 | Fauna at Two Sewage Inflows of Lake | The Nitrate Reductase of Chlorella, |
| BAY OF PLENTY (N.Z.) | Balaton, | W73-02476 50 |
| Direct Observations of Columnar Scattering | W73-02595 SC | BIOCONTROL |
| Associated with Geothermal Gas Bubbling in | BENTHOS | Observations of Declining Water Lettuce Popu |
| the Bay of Plenty, New Zealand, W73-02052 2L | Biomass and Production of Macrobenthos in | lations in Lake Izabal, Guatemala, |
| | the Deeper parts of Kiel Bay in 1968, | W73-02549 2E |
| BAYS | W73-02094 2L | BIODEGRADATION |
| Estuaries, Bays and Coastal Currents Around Puerto Rico. | | Determination of the Rate of Biodegradation is |
| W73-01974 5B | A Survey of the Benthic Macroinvertebrate | Some Polluted Tropical Waters and in Some |
| 36 | Populations in the New Hope and Lower Haw Rivers, | Types of Liquid Wastes Common in Puerto |
| BEACH EROSION | W73-02355 5B | Rico, |
| National Shoreline Study, Regional Inventory | | W73-01973 51 |
| Report, North Atlantic Region. W73-02186 8B | Heavy Metal Analyses of Freshwater Macroin- | Biological Effects of Trinitrotoluene (TNT), |
| | vertebrates from the Lower Haw and New | W73-02101 50 |
| Public Works on Rivers and Harbors (Bill | Hope Rivers, | BIOINDICATORS |
| S.4018). | W73-02356 5A | E. Coli as an Indicator Organism for Disinfec |
| W73-02257 6E | Mathematical Modeling of Estuarine Benthal | tion of Water with Respect to Enteroviruse |
| Hamlin Beach State Park Cooperative Beach | Systems, | Under Various Conditions, |
| Erosion Control Project, Lake Ontario, Mon- | W73-02457 5C | W73-02085 51 |

SUBJECT INDEX

Port : Califorment). W73-0 Lytle a ty, Ca Statem W73-01

Califor ment). W73-01 (Sant Sewer System ment). W73-01 DDT I ton and W73-02

Sacran Califor ment). W73-07

Recent Contin Part B. W73-0 Newha County Califor ment). W73-0 Experi Califor W73-0 Water W73-0 Constr W73-0 CALUM Contro Water nicipal W73-0 CAMDE Niang Impact W73-0 CAMER Photog W73-0 CAMP G Camp tucky W73-0 CANADA Hydro Effect: W73-0

Ice-Co

bia and W73-0

BIOINDICATORS

| Significance of the Fecal Streptococci, Coliform Bacteria and Coliphage in Relation- | BOTTOM SEDIMENTS Tidal Deposits and Their Sedimentary Struc- | BUBBLE SEPARATION Separation of Lignin from Aqueous Solution by |
|---|--|---|
| ship to En' ric Virus Pollution in Sewage and Rivers, | tures, W73-02154 2L | Adsorptive Bubble Separation Processes, W73-02350 5D |
| W73-02119 5B | | |
| Water Quality of Hyrum Lake and Its Relation- ship to Algal Blooms, | The Frequency Distribution of the Current Speed at the Netherlands Lightvessels and Its Possible Influence on the Composition of Sedi- | BUBBLES Direct Observations of Columnar Scattering Associated with Geothermal Gas Bubbling in |
| W73-02121 5C | ments in the Southern North Sea, W73-02155 21 | the Bay of Plenty, New Zealand, W73-02052 2L |
| Salinity-Related Polymorphism in the Brackish- Water Diatom Cyclotella Cryptica, W73-02548 5C | Morphology and Recent Sediments of the | BUCKWHEAT |
| | Western Alboran Basin in the Mediterranean Sea, | The Effect of Some Meteorological Factors on |
| BIOLOGICAL COMMUNITIES The West Falmouth Oil Spill. I. Biology, W73-02023 5C | W73-02494 2J | Buckwheat Yield, (In Russian), W73-02006 3F |
| W73-02023 5C The Structure and Function of Fresh-Water | Radiometric Evidence for Recent Formation of Phosphatic Nodules in Marine Shelf Sediments, | BUDGETING Authorization and Appropriation Processes for |
| Microbial Communities. W73-02095 5C | W73-02497 2J | Water Resource Development, |
| | BOUNDARIES (PROPERTY) | W73-02364 6E |
| A Survey of the Benthic Macroinvertebrate Populations in the New Hope and Lower Haw | Mather V. State (Ownership of Accretion to Islands in a Navigable Stream). | BURG EL-ARAB (EGYPT) Geochemistry of Ground Waters from Burg El- |
| Rivers, W73-02355 5B | W73-02532 6E | Arab Area, Egypt, |
| | BOUNDARY LAYERS | W73-02053 2K |
| BIOLOGICAL MATERIALS Automated Separations in Routine Activation | The Coastal Boundary Layers of a Lake, | BUSHFIRE |
| Analysis of Mercury, | W73-02508 2H | Hydrologic Effects of a Bushfire in a Catchment in Southeastern New South Wales, |
| W73-02015 5A | Density Stratified, Viscous Flow Past a Flat Plate, | W73-02589 4C |
| BIOLOGICAL PROPERTIES An Ecosystematic Study of the South River, | W73-02563 8B | WIZZ L DOC DAV |
| Virginia, | BOUNTIFUL CITY (UTAH) | BUZZARDS BAY The West Falmouth Oil Spill. Data Available in |
| W73-01972 5C | A Mixed Integer Programming Approach to | 1971. II. Chemistry, |
| BIOLOGICAL SAMPLES | Planning Multiple Water Sources for Municipal Water Supply. | W73-02024 5C |
| Automated Separations in Routine Activation Analysis of Mercury, | W73-02540 6A | BYELORUSSIAN POLESYA |
| W73-02015 5A | BOXELDER CREEK | Feeding, Dietary Interrelationships of Fish and the Effectiveness of Their Use of Food |
| BIOLOGY The West Falmouth Oil Spill. I. Biology, | Boxelder Creek Watershed Project, Colorado and Wyoming (Final Environmental Impact | Resources in Natural Bodies of Water in the Byelorussian Polesya. II. Diet of Goldfish in |
| W73-02023 5C | Statement). W73-02235 4D | Lakes, W73-02590 2H |
| BIOMASS Comparison of Benthic Infaunal Abundance on | | |
| Two Abyssal Plains in the Northeast Pacific Ocean with Comments on Deep-Sea Food | BRAIDING Field Mapping and Computer Simulation of | The World's Deepest Cable Tool Well, |
| Sources, | Braided-Stream Networks, W73-02490 2J | W73-02388 8B |
| W73-02017 5A | BRIDGE CONSTRUCTION | Cable Tool Drilling, An Investigation of the |
| Biomass and Production of Macrobenthos in the Deeper parts of Kiel Bay in 1968, | Baltimore Harbor Outer Crossing (Patapsco River Bridge) Baltimore, Maryland (Final En- | Relation Between the Natural Stroke Frequen- cies of Cable-tool Systems and the Operating Strokes per Minute, |
| W73-02094 2L | vironmental Impact Statement). | W73-02407 8G |
| BIOTOPES Hydrobiological Research on Amsterdam | W73-02518 8A | CADMIUM |
| Island: 1969-1970 Exploratory Campaign, W73-02582 2I | BRINE DISPOSAL Concentration of Brines by Spray Evaporation, W73-02081 SE | Some Studies on the Chronic Toxicity of Cad- mium and Hexavalent Chromium in Drinking |
| BITUMINOUS MATERIALS | | Water, W73-02428 5C |
| The Asphaltic Lining of Dungonnel Dam, W73-02073 8A | BRINES Water Pollution by Oil-Field Brines and Re- | CALANOID COPEPODS |
| BLOOD | lated Industrial Wastes in Ohio, W73-02192 5B | Zooplankton of the Sandy Bay Area, N.J., |
| Determination of Manganese, Copper, and Iron in Human Blood by Neutron Activation Analy- | | W73-02448 5C |
| sis, | A Fracture Criterion for Brittle Anisotropic | CALESTIENNE |
| W73-02018 5A | Rock, | Study of a Topo-Lithological Transect of the Eprave-Rochefort Surroundings (Lomme Val- |
| BOREHOLE CAMERAS | W73-02397 8E | ley, Southeast Belgium) to Delimitate the |
| Photographic Examination of Wells, W73-02409 8G | BROOK TROUT Effect of Lime Neutralized Iron Hydroxide | Forest Ecological Groups of the Calestienne, W73-02294 4A |
| BOREHOLE GEOPHYSICS | Suspensions on Juvenile Brook Trout (Sal- | |
| Cement Bond Logging, an Aid to Better | velinus Fontinalis, Mitchill), W73-02277 5C | CALIFORNIA Optimization of Water Resources Develop- |
| Completion Practices, W73-02385 8F | | ment: Optimization of Capacity Specifications |
| | BROWN'S SLOUGH (ALASKA) Small Boat Harbor Project, Bethel, Alaska | for Components of Regional, Complex In- tegrated, Multipurpose Water Resources |
| BOREHOLES Seismic Borehole Plug, | (Final Environmental Impact Statement). | Systems, |
| W73-02384 8C | W73-02264 4A | W73-01970 6A |

4A

| California (Draft Environmental Impact State- ment). | on the Devon Island Ice Cap, N.W.T., Canada, W73-02046 2C | Chemical Responses by Marine Organisms to Stress, Stress in Hard Clams from a Polluted |
|---|--|--|
| W73-01984 8A | Regeneration of Steelworks Hydrochloric Acid | Estuary, |
| Lytle and Warm Creeks, San Bernardino Coun- | Pickle Liquor, | W73-01975 SC |
| ty, California (Final Environmental Impact | W73-02198 5D | Release of Dissolved Organic Matter by Marine Macrophytes, |
| Statement). W73-01987 8A | Simulation of the Mean Performance of Mu- | W73-02100 5C |
| | nicipal Waste Treatment Plants, | CARBON DIOXIDE |
| Tehama-Colusa, Central Valley Project, California (Final Environmental Impact State- | W73-02212 5D | Diffusion Resistance of Leaves in Connection |
| ment). | Summary of Current Research on Snow and Ice in Canada. | with their Anatomy (In Russian), W73-02133 21 |
| W73-01994 8A | W73-02310 2C | THE WAR PROPERTY OF THE PERSON NAMED AND ADDRESS OF THE PERSON |
| (Santa Rosa, Sonoma County, California, | Analysis of Chlorinated Hydrocarbon Pesti- | The Functional Adaptation of Lichens to Ecological Conditions of Arid Areas, |
| Sewer Collection and Water Distribution System), (Draft Environmental Impact State- | cides in Waters and Wastewaters, | W73-02193 2I |
| ment). | W73-02313 5A | A Regulatory Mechanism for CO2 Assimilation |
| W73-01996 3D | Research Projects in Glaciology, 1972. | in Plant Photosynthesis: Activation of Ribu- |
| DDT Residues in Coastal Marine Phytoplank- | W73-02314 2C | lose-1,5-Diphosphate Carboxylase by Fructose 6-Phosphate and Deactivation by Fructose 1,6- |
| ton and Their Transfer in Pelagic Food Chains, | Seismic Profiling and Geology of the Toronto | Diphosphate, |
| W73-02105 5C | Waterfront Area of Lake Ontario, W73-02501 2H | W73-02474 5C |
| Sacramento River Bank Protection Project, | AND THE PARTY OF T | CARBON RADIOISOTOPES |
| California (Draft Environmental Impact State- ment). | Hydrogeology of the Forty Mile Creek | The Influence of a Short Period of Evaporative Cooling on the Distribution of 14C in Potato |
| W73-02266 8D | Drainage Basin on the South Shore of Lake Ontario. | Plants, |
| Recent Sediments of the Central California | W73-02503 2H | W73-01969 3F |
| Continental Shelf-Pillar Point to Pigeon Point: | Maintenance of Water Quality-Alberta's | CARBONATE KARST |
| Part B. Mineralogical Data, | Legislative Scheme and the Common Law, | Karst in Carbonate Rocks (Karst v karbonat- nykh porodakh). |
| W73-02319 2J | W73-02525 5G | W73-02059 2F |
| Newhall, Saugus and Vicinity, Los Angeles | Preliminary Analysis of Surface Water Availa- | CARBONATE ROCKS |
| County, Santa Clara River and Tributaries, California (Draft Environmental Impact State- | bility, W73-02544 4A | Karst in Carbonate Rocks (Karst v karbonat- |
| ment). | | nykh porodakh). W73-02059 2F |
| W73-02521 8A | Simulation Studies of the Adams River Sockeye Salmon (Oncorhynchus nerka), | |
| Experiences with Wastewater Disinfection in | W73-02580 8I | CARCINOGENS Resistance of Carcinogenic Organic Com- |
| California, W73-02539 SD | The Gaspe Cod Ecosystem in the Gulf of St. | pounds to Oxidation by Activated Sludge, |
| W73-02539 5D | Lawrence: II, Weekly Fluctuations of Com- | W73-02535 5D |
| Water Economics, | mercial Trawl Catches of Cod With Depth and Temperature in 1960-1962, | CARIBBEAN SEA |
| W73-02543 4B | W73-02581 2L | Diffusivity of Suspended Matter in the Carib- bean Sea, |
| Some Effects of Logging and Associated Road | CANAL CONSTRUCTION | W73-02171 2J |
| Construction on Northern California Streams, W73-02573 4C | Tehama-Colusa, Central Valley Project, | CARIES PREVENTION |
| | California (Final Environmental Impact State- ment). | Alternatives for Fluoridation of Aqueducts (In |
| CALUMET (MICH) Control of Nitrate Contamination of Ground | W73-01994 8A | Italian), W73-02160 5G |
| Water Associated with Land Disposal of Mu- | CANALS | |
| nicipal Sewage, W73-02111 5B | Discon V. Saray, Inc. (Access Rights of Lan- | CARP (GERMAN) The German Carp (Carassius auratus gibelio |
| | downers Bordering Navigable Canal). W73-02237 6E | Bloch) from the Ilownica River Stocked in a |
| CAMDEN COUNTY (MO) | | Carp Pond, W73-02026 8I |
| Niangua Hydro Project (Draft Environmental Impact Statement). | CAPE FEAR RIVER BASIN An Analysis of Forested Watershed Land of | CARPATHIAN MOUNTAINS |
| W73-02515 8C | the Cape Fear River Basin Using a Computer- | Investigation of the Rates and Traveltime of |
| CAMERAS | Oriented Alphanumeric Map Information As- | Storm Runoff in the Carpathians (K voprosu ob |
| Photographic Examination of Wells, | sembly and Display System, W73-02358 7C | issledovanii skorostey i vremeni dobeganiya livnevykh vod v Karpatakh), |
| W73-02409 8G | | W73-02334 4A |
| CAMP GROUND LAKE (KENTUCKY) | CAPE FEAR RIVER (NC) A Survey of the Beathic Macroinvertebrate | Relation of Ice Freezeup Dates and Ice-Cover |
| Camp Ground Lake, Salt River Basin, Ken- | Populations in the New Hope and Lower Haw | Duration to Elevation and Channel Slopes of |
| tucky (Draft Environmental Impact Statement). W73-02269 8A | Rivers, W73-02355 5B | Carpathian Rivers (O svyazi srokov ustanovleniya i prodoizhitel'nosti ledostava s |
| CANADA | | vysotoy mestnosti i uklonami na rekakh Kar- |
| Hydrometeorological Relationships and Their | Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New | pat), W73-02337 4A |
| Effects on the Levees of a Small Arctic Delta, | Hope Rivers, | |
| W73-02041 8D | W73-02356 5A | CARPATHIANS Hydrologic Investigations and Flow Computa- |
| Ice-Cored Moraines in Southern British Colum- | CAPITAL COSTS | tions (Gidrologicheskiye issledovaniya i |
| bia and Alberta, Canada, W73-02042 2C | Pollution Cleanup Costs Nailed Down. W73-02283 5G | raschety stoka). W73-02330 4A |

The dy, W73

> Phys Any, W73

CHIMA Chor phila gosla W73

CHIPP The IV. 7 W73

CHIRC Subs matic Chirc fakto Chirc W73-

Note Chire (In Ja W73

CHLAI Biolo W73

Tran ment W73

Heave with gent W73

The and Subs W73

The W73

CHLOI Effe Chlo (In R W73

CHLOI Anio Phos W73 CHLOI Mett Wast W73 CHLOI PESTIC Tran ment W73

Jet C W73-

CARRYING CAPACITY

| CARRYING CAPACITY Carrying Capacity of Drilling Muds, | Port Hueneme Harbor, Ventura County, California (Draft Environmental Impact State- | CHELATION Heavy Metal Ion Interaction and Transport |
|---|--|--|
| W73-02379 8B | ment). W73-01984 8A | with Synthetic Complexing Agents and Deter- gent Phosphate Substitutes in Aquatic Systems, |
| CASTLE DANGER (MINN) Taxonomy of North Shore Periphyton, Lake Superior, Castle Danger Studies 1970-1971, | Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). | W73-02112 5A CHEMCONTROL |
| W73-02555 5C | W73-02264 4A | Water Quality Criteria Data Book - Volume 3: |
| Pollution and the Ecology of Nearshore Periphyton of Lake Superior: The Effects of Calefaction on Periphyton, | Big Creek and Metro Zoo Flood and Aesthetic Improvement, Cleveland, Ohio (Draft Environ- mental Impact Statement). | Effects of Chemicals on Aquatic Life, Selected Data from the Literature Through 1968. W73-01976 5C |
| W73-02556 5C | W73-02268 4A | The Molluscicide Action of Thiol Reagents (Die |
| CATCHMENT Hydrologic Effects of a Bushfire in a | River Rouge Flood Control Project, Wayne County, Michigan (Final Environmental Impact | Molluscizide Wirkung Von Thiol-Reagentien), W73-02275 5C |
| Catchment in Southeastern New South Wales, W73-02589 4C | Statement). W73-02270 4A | CHEMICAL ANALYSIS Chemical Analyses of Water from Wells in |
| CATIONIC ASPHALT | Saint Catherine Sound, Maryland (Maintenance | Harris County, Texas, 1922-71, |
| Drilling and Grouting Experiences in Un- derground Construction, | Dredging) (Final Environmental Impact Statement). | W73-02038 2K |
| W73-02070 8A | W73-02516 4A | Water Resources Data for Colorado, 1971: Part |
| CATTLE Accumulations of Certain Pesticides in Adipose | Newhall, Saugus and Vicinity, Los Angeles | 2. Water Quality Records. W73-02039 2K |
| Tissues and Performance of Angus, Hereford | County, Santa Clara River and Tributaries, California (Draft Environmental Impact State- | Neutron Activation Analysis of Water-A |
| and Holstein Steers Fed Apple Processing Wastes. | ment). | Review, |
| W73-02204 5C | W73-02521 8A | W73-02166 SA |
| CELLULOSE ACETATE MEMBRANES | CHANNEL IMPROVEMENTS | Laboratory Methods for the Measurement of |
| Studies on Reverse Osmosis for Water Pollu- tion Control, | Lytle and Warm Creeks, San Bernardino Coun- ty, California (Final Environmental Impact | Pollutants in Water and Waste Effluents, W73-02167 5A |
| W73-02225 5D | Statement). W73-01987 8A | Chemical Analyses of Water From Observation |
| CEMENT GROUTING | | Wells in the Edwards and Associated |
| Cement Bond Logging, an Aid to Better Completion Practices, | Miami Harbor, Florida, Navigation (Final En- vironmental Impact Statement). | Limestones, San Antonio Area, Texas, 1967. W73-02307 |
| W73-02385 8F | W73-02517 8A | Analysis of Chloriested Westersedow Besti |
| Well Grouting and Well Protection, | CHANNEL MORPHOLOGY | Analysis of Chlorinated Hydrocarbon Pesti- cides in Waters and Wastewaters, |
| W73-02408 8F | Bedforms of the Tana River, Norway, W73-02047 2C | W73-02313 5A |
| A Proven Squeeze-Cementing Technique in a | | Time Stability of Aqueous APDC and Its Man- |
| Dolomite Reservoir, W73-02421 8F | Re-evaluation of the Relationship of Master Streams and Drainage Basins, | ganese and Nickel Complexes in MIBK, W73-02320 2K |
| CENSUS | W73-02488 2J | CHEMICAL PURISTRY |
| The Census and Water Utilities, | CHANNELS | Pollution Cleanup Costs Nailed Down. |
| W73-02136 6D | Soil Erosion and Channel Processes. No. 2. | W73-02283 5G |
| National Shoreline Study, Regional Inventory | (Eroziya pochv i ruslovyye protsessy. Vypusk 2.). | CHEMICAL PROPERTIES |
| Report, North Atlantic Region. W73-02186 8B | W73-02062 2J | Annotated Bibliography of Lake Ontario Lim- |
| | CHARA | nological and Related Studies. I Chemistry, W73-02443 5C |
| Hawaii Regional Inventory of the National Shoreline Study. | The Impact of Reduced Light Penetration on a | |
| W73-02321 8B | Eutrophic Farm Pond, W73-02349 5C | CHEMICAL PULPING Magnesium Bisulfite Recovery Startup, |
| CENTRAL CALIFORNIA | CHARACEAE SPECIES | W73-02224 5D |
| Recent Sediments of the Central California Continental Shelf-Pillar Point to Pigeon Point: | Records About Ecology of Some Characeae | CHEMICAL REACTIONS |
| Part B. Mineralogical Data, | Species from the Floodplain of the Danube, (In | Chemical Aspects of Bioassay Techniques for |
| W73-02319 2J | Rumanian), W73-02249 2I | Establishing Water Quality Criteria, |
| CENTRAL VALLEY (CALIF) | CHARGES | W73-02446 5A |
| Tehama-Colusa, Central Valley Project, California (Final Environmental Impact State- | Rate Design and Cost of Service, | CHEMICAL WASTES |
| ment). | W73-02298 6C | Fish Populations Around Edgewood Arsenal's Chemical Agent Test Area, |
| W73-01994 8A | CHATHAM HARBOR (MASS) | W73-02021 |
| CHANNEL CATFISH | Maintenance Dredging, Chatham (Stage) Har- | CHEMILUMINESCENCE |
| Interactions of Feeding Rates and Environmen- tal Temperature on Growth, Food Conversion, | bor, Massachusetts (Draft Environmental Impact Statement). | Development of a Tape Transport Bacterial De- |
| and Body Composition of Channel Catfish, | W73-02262 4A | tection System; Final Report, W73-02012 5A |
| W73-02572 8I | CHATTAHOOCHEE RIVER (ALA) | AND THE PERSON OF THE PERSON O |
| CHANNEL IMPROVEMENT Military Ocean Terminal, Sunny Point, North Carolina (Draft Environmental Impact State- | Dredging and Filling, Cowikeee State Park, Lakepoint Resort, Walter F. George Lake, Chattahoochee River, Alabama (Draft Environ- | CHEROKEE NATIONAL FOREST (TENN) Unit Plan for Management of the Hiwassee Unit, Cherokee National Forest, Tennessee |
| ment). | mental Statement). W73-02233 4A | (Draft Environmental Impact Statement). W73-02519 4D |
| W73-01981 4A | W73-02233 4A | 1113-06313 |

| CHESAPEAKE BAY | Virucidal Effects of Chlorine in Wastewater, | CLEAN WATER RESTORATION ACT |
|--|---|--|
| The Corps of Engineers Chesapeake Bay Stu- | W73-02538 5D | Repair and Protect Our Natural Environment, W73-01993 |
| dy. W73-02149 2L | Experiences with Wastewater Disinfection in | W73-01993 6E |
| Physical Chamical Crisis Indicators Are There | California, | CLEVELAND (OHIO) |
| Physical-Chemical Crisis Indicators—Are There Any, | W73-02539 5D | Big Creek and Metro Zoo Flood and Aesthetic |
| W73-02150 5A | CHLORINE | Improvement, Cleveland, Ohio (Draft Environ- mental Impact Statement). |
| CHIMAPHILA UMBELLATA D | Chlorobiphenyls (PCBs) in the Milwaukee | W73-02268 4A |
| Chorology, Ecology and Sociology of Chima- | River, W73-02084 5C | OF THE STATE OF TH |
| phila Umbellata (L.) Bart. In Slovenia (Yu- | 7754200 | CLIMATIC PARAMETERS Irrigation ManagementA Tool for Agribusi- |
| goslaviaia), W73-02272 21 | Effects of Temperature on Osmotic and Ionic | ness, |
| W13-02212 | Regulation in Goldfish, W73-02103 5C | W73-02546 3F |
| CHIPPING QUALITY | #13-02103 | OF INCOMES IN IN IN INCOMES IN |
| The Influence of Mist Irrigation on the Potato IV. Tuber Quality Factors, | CHLOROETHYLTRIMETHYL | CLINCHFIELD DAM AND RESERVOIR (NORTH CAROLINA AND SOUTH CAROLINA) |
| W73-01968 3F | Effect of Foliar Spray and Soil Application of CCC on Transpiration and Dry Matter Produc- | Clinchfield Dam and Reservoir, Broad River |
| OWN OWN AND A | tion of Spring Wheat, | Basin, North Carolina and South Carolina |
| CHIRCHIK RIVER Subsurface Water as a Major Factor in the For- | W73-02499 2D | (Draft Environmental Impact Statement). W73-02524 8D |
| mation of Landslides on the Left Bank of the | CHROME | W 75-02524 |
| Chirchik River (Podzemnyye vody-osnovnoy | Pollution Control Shines in Chrome Chemicals | CLOSTRIDIUM |
| faktor formirovaniya opolzney levoberezh'ya Chirchika), | Plant. | Development of a Tape Transport Bacterial De- |
| W73-02066 2J | W73-02282 5G | tection System; Final Report, W73-02012 5A |
| | CHROMIUM | W 75-02012 |
| CHIRONOMUS PLUMOSUS Note on the Swimming Behavior of | Some Studies on the Chronic Toxicity of Cad- | CLOUD SEEDING |
| Chironomus Plumosus Larvae in Lake Suwa, | mium and Hexavalent Chromium in Drinking | Design, Execution, and Results of a Mesoscale |
| (In Japanese), | Water, W73-02428 5C | Snowstorm Modification Project, W73-02483 2C |
| W73-02586 2H | | W 15-02-465 |
| CHLAMYDOMONAS REINHARDI | CILIATES | CLOVERS |
| Biological Effects of Trinitrotoluene (TNT), | Comparative Study of the Ecology of Free-Liv- ing Ciliates in the Rugozersky Inlet (Kan- | The Trifolium L. Species of Pechora's Flood- plain. |
| W73-02101 5C | dalaksha Bay, White Sea), | W73-02005 3F |
| CHLORDANE | W73-02585 5C | |
| Transfer of Pesticides Through Water, Sedi- | CIPC | COAGULANT AIDS |
| ments and Aquatic Life, W73-01959 5B | Microbial Degradation of Pesticides in Aqueous | Practical Experience in the use of Polyelec- trolytes, |
| W 73-01939 | Solutions, | W73-02203 5D |
| CHLORELLA | W73-02534 5B | |
| Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Deter- | CIRCULATION | COAGULANT RECYCLING |
| gent Phosphate Substitutes in Aquatic Systems, | Volume Requirements for Air or Gas Drilling, | Magnesium Carbonate: A Recycled Coagulant - II. |
| W73-02112 5A | W73-02381 8B | W73-02145 5F |
| The Adhesive Properties of Chlorella Vulgaris, | Applications of Some Numerical Models to | COLCULATION |
| and the Enhancement of This Adhesion by | Pacific Northwest Estuaries, | COAGULATION Applications of Agglomerate Testing to |
| Substances Found in Ambient Sea Water, | W73-02456 5C | Problems in Water Resources Management, |
| W73-02470 5C | CIRSIUM PALUSTRE D | W73-01965 5F |
| The Nitrate Reductase of Chlorella, | Contribution to the Ecology of Cirsium Pa- | Magnesium Carbonate: A Recycled Coagulant - |
| W73-02476 5C | lustre (L.) Scop, | II, |
| CHLORIDE | W73-02279 2I | W73-02145 5F |
| Effect of Drinking Water with Different | CITIES | COASTAL PLAINS |
| Chloride Contents on Experimental Animals, (In Russian). | Inventory of Water Diversions and Rate Struc- | Hydrometeorological Relationships and Their |
| W73-02020 5C | tures for Cities, Towns, and Villages in New Mexico, | Effects on the Levees of a Small Arctic Delta, |
| | W73-01963 6C | W73-02041 8D |
| CHLORIDES Anion Exchange Equilibria Involving | | COASTAL WATERS |
| Phosphate, Sulphate and Chloride, | CITY PLANNING Water Resource Planning. | Prompt Passage of Ocean Dumping Bill is |
| W73-02208 5D | W73-02368 6B | Urged, |
| CHLORINATED HYDROCARBON PESTICIDES | | W73-02255 6E |
| Methods for Organic Pesticides in Water and | CLAMS Chemical Responses by Marine Organisms to | The Need to Control Ocean Dumping, |
| Wastewater. | Stress, Stress in Hard Clams from a Polluted | W73-02526 6E |
| W73-02436 5A | Estuary, | COASTAL ZONE MANAGEMENT |
| CHLORINATED HYDROCARBONS | W73-01975 5C | Recent Federal Policies Affecting Marine |
| PESTICIDES Transfer of Pasticides Through Water Sadi- | CLASSIFICATION | Science and Engineering Development, |
| Transfer of Pesticides Through Water, Sedi- ments and Aquatic Life, | Proposed Reclassifications of Certain Waters in | W73-02466 5C |
| W73-01959 5B | the Cape Fear, Lumber, and Yadkin-Pee Dee | COASTAL ZONE MANGEMENT |
| CHLORINATION | River Basins to be Considered at a Public Hear- ing to be Held on November 2, 1972, in | Historical Changes of Estuarine Topography |
| Jet Cleaning of Water Wells Described. | Southern Pines, North Carolina. | With Question Of Future Management Policies, |
| W73-02417 8B | W73-01983 5G | W73-02464 5C |

Metho Standa W73-0

CONVE Note of fusion W73-0

Therm W73-0 Fisher Sewag W73-0

Quant the Bi III. I Calan W73-0

A Sir Plankt W73-0

Deten in Hu sis, W73-0 Effec (Cu, Metal W73-0

Heav with gent I W73-4 CORE I Rotar III, 1 Bore Alask W73-4 Full (tions, W73-CORRO Micro W73-

The Water W73-

A R Probl W73-

COST A Econ Capa Plant W73-

Indus W73-

Closi W73-

What W73-

| COASTS | Magnesium Carbonate: A Recycled Coagulant - | CONDUCTIVITY |
|---|--|--|
| Estuaries, Bays and Coastal Currents Around Puerto Rico, | II, W73-02145 SF | Mobilities of Injected Ions in Liquid Water, W73-02114 5A |
| W73-01974 5B | A STATE OF THE PARTY OF THE PAR | and the second s |
| National Shoreline Study, Regional Inventory | Water Resources Data for Colorado, 1971: Part | CONFERENCES Proceedings, Fourteenth Conference on Great |
| Report, North Atlantic Region. | 2. Water Quality Records. | Lakes Research. |
| W73-02186 8B | W73-02039 2K | W73-02498 2H |
| The Drive To Save America's Shorelines. | Frost Cracking in the Colorado Front Range, | CONJUNCTIVE USE |
| W73-02248 6E | W73-02043 2C | Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface |
| Characteristics of Estuarine Sediments of the | Pueblo Dam and Reservoir, Fryingpan-Arkan- | Water Reservoirs, |
| United States. | sas Project Colorado (Final Environmental Im- | W73-02083 3A |
| W73-02481 2L | pact Statement). | A Water Quality Model for a Conjunctive Sur- |
| COBALT | W73-02265 8D | face-Groundwater System: An Overview, |
| The Determination of Traces of Cobalt and of | COLORADO RIVER | W73-02178 5B |
| Nickel in Mineral Waters. | The Mexican Water Treaty and its Relationship | The state of the s |
| W73-02071 2K | to Colorado River Water Supplies, | Water Economics, |
| Commenced from the commenced for J | W73-02529 5G | W73-02543 4B |
| COD | | CONNECTICUT |
| The Gaspe Cod Ecosystem in the Gulf of St. | COLUMBIA RIVER | Pave the Wetlands or Let Them Be, |
| Lawrence: II, Weekly Fluctuations of Com- | Radionuclides in Transport in the Columbia | W73-02252 6E |
| mercial Trawl Catches of Cod With Depth and | River from Pasco to Vancouver, Washington, W73-02022 5B | A SCHOOL SECTION OF SEC |
| Temperature in 1960-1962, W73-02581 2L | W73-02022 5B | CONNECTICUT WETLANDS PROTECTION |
| W 15-02501 2L | COMMON LAW | ACT |
| COLD WATER MASS | Maintenance of Water Quality-Alberta's | Pave the Wetlands or Let Them Be, W73-02252 6E |
| The Hydrological Conditions for the Entry of | Legislative Scheme and the Common Law, | W 73-02232 OE |
| Sagitta Enflata Into Osaka Bay: II. In The Case | W73-02525 5G | CONOWINGO (MD) |
| of Appearance of a Cold Water Mass (In | | Suspended Sediment Discharge of the |
| Japanese), | COMMON POOL PROBLEM | Susquehanna River at Conowingo, Maryland, |
| W73-02587 2L | A Re-Examination of the Common Pool | During 1969, |
| COLIFORMS | Problem, W73-01956 4B | W73-02445 2J |
| Optical Signatures of the Near-Shore Waters of | W/3-01930 4B | CONSERVATION |
| Southern Monterey Bay, | COMPOSITIONAL LOGGING | The Drive To Save America's Shorelines. |
| W73-02027 5A | Compositional Logging of Air-Drilled Wells, | W73-02248 6E |
| | W73-02377 8B | |
| E. Coli as an Indicator Organism for Disinfec- | | CONSOLIDATED AQUIFERS |
| tion of Water with Respect to Enteroviruses | COMPOSTING | Yields of Shallow Dolomite Wells in Northern |
| Under Various Conditions, | Closing the Gap in Waste Management, W73-02215 5D | Illinois, W73-02399 4B |
| W73-02085 5F | W73-02215 5D | 113-02337 |
| Experiences with Wastewater Disinfection in | COMPUTER PROGRAMS | Yields of Wells in Pennsylvanian and Mississip- |
| California, | A Hybrid Computer Program for Predicting the | pian Rocks in Illinois, |
| W73-02539 5D | Chemical Quality of Irrigation Return Flows, | W73-02400 4B |
| CALL DOWN IN A CONTAIN | W73-02177 5B | CONSOLIDATION |
| COLLECTIVE ACTION | The Sucley Sustant for Date Anglusis of History | Rate of Settlement Under Two- and Three- |
| The Framework for Analysis, W73-02300 6G | The Syslab System for Data Analysis of Histor- ical Water-Quality Records (Basic Programs), | Dimensional Conditions, |
| W 73-02300 6U | W73-02437 7C | W73-02075 8D |
| COLLEGES | 113-02431 | |
| Surface Waters of a Small City (Springfield, | Multivariate Approaches to Algal Strategies | CONSTANT-RATE DRAWDOWN TEST |
| Mass), | and Tactics in the Systems Analysis of | Readers Comment on Step Drawdown Test, W73-02419 8G |
| W73-01961 6G | Phytoplankton, | W 73-02419 |
| COLLIN COUNTY (TPY) | W73-02469 5C | CONSTRUCTION EQUIPMENT |
| COLLIN COUNTY (TEX) Annual Compilation and Analysis of Hydrolog- | Efficiency and Utility of Collocation Methods | Procedures for Installing Well Screens. |
| ic Data for Little Elm Creek, Trinity River | in Solving the Performance Equations of Flow | W73-02415 8A |
| Basin, Texas, 1970, | Chemical Reactors with Axial Dispersion, | CONSTRUCTION MATERIALS |
| W73-02324 7C | W73-02552 5D | Water wells and Ground Water Contamination, |
| AND THE RESERVE OF THE PARTY. | and the same of th | W73-02413 5B |
| COLLOCATION METHOD | COMPUTERS | |
| Efficiency and Utility of Collocation Methods | Irrigation ManagementA Tool for Agribusi- | CONSTRUCTION METHODS |
| in Solving the Performance Equations of Flow | ness, W73-02546 3F | Drilling and Grouting Experiences in Un- |
| Chemical Reactors with Axial Dispersion, | W73-02546 3F | derground Construction, |
| W73-02552 5D | CONCRETE LINED CANALS | W73-02070 8A |
| COLOMBIA | River Rouge Flood Control Project, Wayne | CONTAMINATION |
| Leaf Temperature and Transpiration Measure- | County, Michigan (Final Environmental Impact | Water Supply Sources for the Farmstead and |
| ments of Tribulus Cistoides L. In Northern | Statement). | Rural Home. |
| Colombia, | W73-02270 4A | W73-02418 4B |
| W73-02195 2D | Newhall, Saugus and Vicinity, Los Angeles | COMPRESENT OFFICE |
| COLOB | County, Santa Clara River and Tributaries, | Recent Sediments of the Central California |
| COLOR Assessment of Turbidity, Color, and Odor in | California (Draft Environmental Impact State- | Continental ShelfPillar Point to Pigeon Point: |
| Water. | ment). | Part B. Mineralogical Data, |
| W73-01971 5G | W73-02521 8A | W73-02319 2J |
| | | |

COLOR

| CONTROL Methodology in Establishing Water Quality | 15 Towns Join Hands, W73-02223 5D | Agrometeorological Conditions and Characteristics of the Maize Development in the Plant- |
|---|--|--|
| Standards, W73-02536 5G | Evaluating Economy of Scale, | ing-Sprouting Period, (In Bulgarian), W73-01999 |
| | W73-02542 5D | THE STATE OF THE S |
| CONVECTION Note on the Finite Element Solution of the Dif- | COST-BENEFIT ANALYSIS | The Development of Rice Grains Under Con- trolled Environment: II. The Effects of Tem- |
| fusion-Convection Equation, W73-02338 2E | What Price Water, W73-02284 6B | perature Combined With Air-Humidity and |
| | W/3-02204 6B | Light Intensity During Ripening on Grain |
| COOLING WATER Thermal Effects of Power Plants on Lakes, | Economic Analysis of Alternative Water Pollu- | Development, W73-02001 3F |
| W73-02068 2H | tion Control Measures, W73-02550 5G | the state of the s |
| | OR THE STATE OF TH | The Influence of Post-Irrigation Soil Cultiva- |
| Fisheries, Cooling-Water Discharges and Sewage and Industrial Wastes, | COST COMPARISON Closing the Gap in Waste Management, | tions on the Sugar Beet Yield, (In Bulgarian), W73-02003 |
| W73-02433 5C | W73-02215 5D | |
| COPEPODS | COST EFFECTIVENESS | Biological and Economic Properties of Certain |
| Quantitative Fluctuations in the Zooplankton of | Wastewater Treatment Works Planning, | Foreign Irrigated Soft Wheat Varieties, (In Bul- garian), |
| the Baie-Des-Chaleurs (Saint-Lawrence Gulf): III. Fluctuations in Copepods Other Than | Economics and Technology-Some New | W73-02004 3F |
| Calanus, | Directions, W73-02296 5D | The Effect of Some Meteorological Factors on |
| W73-02570 2L | | Buckwheat Yield, (In Russian), |
| A Simple Device for the Sorting of Living | COST-SHARING | W73-02006 3F |
| Planktonic Copepods, | The Problems and Issues of Implementing Na- tional Water Legislation at Subnational Levels, | Effect of Mineral Fertilizers and Irrigation on |
| W73-02598 7B | W73-02242 6E | the Yields of Basic Crops, (In Russian), |
| COPPER | COSTS | W73-02007 3F |
| Determination of Manganese, Copper, and Iron in Human Blood by Neutron Activation Analy- | Economic Analyses of Optimal Water Quality | Determination of Moisture Supply and Cotton |
| sis, | Management, | Yield in Uzbekistan, (In Russian), |
| W73-02018 5A | W73-01951 5G | W73-02008 3F |
| Effect of Dietry Deficiency of Trace Elements | Cost of Public Water Service in Ohio, | Some Important Aspects of the Breeding, Ir- |
| (Cu, Mo, Mn) on Water and Electrolyte | W73-02285 6C | rigation, and Agrotechniques of Rice, (In Rus- |
| Metabolism, W73-02086 5C | Rate Design and Cost of Service, | sian). |
| | W73-02298 6C | W73-02009 3F |
| Heavy Metal Ion Interaction and Transport | Preliminary Analysis of Surface Water Availa- | Physiological Aspects of the Water Regime of |
| with Synthetic Complexing Agents and Deter- gent Phosphate Substitutes in Aquatic Systems, | bility, | Plants as Related to Drought Resistance Stu- |
| W73-02112 5A | W73-02544 4A | dies of Some Oil Crops, (In Russian), W73-02013 3F |
| CORE DRILLING | COTTON | W15-02015 |
| Rotary Drilling and Coring in Permafrost: Part | Determination of Moisture Supply and Cotton Yield in Uzbekistan, (In Russian), | CRYOGENIC CABLES |
| III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, | W73-02008 3F | Researchers Seek Ways to Lower Costs of Un- derground Transmission Systems, |
| Alaska, | COUNCIL ON ENVIRONMENTAL QUALITY | W73-02074 8C |
| W73-02312 8B | Clean Rhetoric and Dirty Water, | CRYOLOGY |
| Full Core Recovery in Unconsolidated Forma- | W73-02260 6E | CRYOLOGY Some Observations on Superimposition of Ice |
| tions, W73-02390 8G | COURTS | on the Devon Island Ice Cap, N.W.T., Canada, |
| W73-02390 8G | Courts and Water, The Role of the Judicial | W73-02046 2C |
| CORROSION CONTROL | Process, | Computing Salinity Profiles in Ice, |
| Microbiological Corrosion in Water Floods, W73-02404 8G | W73-02365 6E | W73-02054 2C |
| The Analytical Control of Anti-Corrosion | CRANBERRIES-D | Commission and Commission of the West |
| Water Treatment, | Biological Characteristics of Cranberries and the Problem of Their Cultivation. 1. Effect of | Snow Structure and Snow Regime of the West Siberian Taiga (Struktura i rezhim snezhnoy |
| W73-02411 5F | Ground Water Level, Sand Layer Thickness | tolshchi zapadmosibirskoy taygi), |
| COST ALLOCATION | and Type of Peat on Rootage of Cuttings and | W73-02063 2C |
| A Re-Examination of the Common Pool | Shoot Growth, (In Lithuanian), W73-02025 3F | CRYSTALLINE ROCKS |
| Problem, W73-01956 4B | CREOT CELCE CLOSC | Studies of Saprolite and Its Relation to the |
| 1000 | CREST-STAGE GAGES Crest-Stage Gaging Stations in OregonA Com- | Migration and Occurrence of Groundwater in Crystalline Rocks, |
| COST ANALYSIS Economic Limit for the Amount of Reserve | pilation of Peak Data Collected from October | W73-01955 2F |
| Capacity on Construction of Sewage Treatment | 1952 to September 1972, W73-02034 7C | |
| Plants for Rapidly Growing Municipalities, | | CRYSTALS Snow Structure and Snow Regime of the West |
| W73-02211 5D | CRIBBING Precast Concrete Should Prove Popular for | Siberian Taiga (Struktura i rezhim snezhnoy |
| Industrial Waste and the Small City. | Crib Walling. | tolshchi zapadmosibirskoy taygi), |
| W73-02214 5D | W73-02079 8F | W73-02063 2C |
| Closing the Gap in Waste Management, | CROP PRODUCTION | CULTIVATION |
| W73-02215 5D | The Effect of Fertilizers on Seed Production of | The Influence of Post-Irrigation Soil Cultiva- |
| What's So Great About MgCO3, W73-02219 5F | Irrigated Alfalfa. (In Ukrainian), W73-01997 3F | tions on the Sugar Beet Yield, (In Bulgarian), W73-02003 3F |
| W 13-04419 3F | 1112-01221 | , |

DDT Trans ments W73-0 DDT ton an W73-0

Accum Tissue and I Waste W73-0

Metab W73-0 DECISIO Manag Proces W73-0 Enviro Certain Altern W73-0

> ple Soc W73-0 Courts

Proces W73-0

W73-0 Modeli Decisio W73-0

DEEP PE Ground mation bilizati W73-02

DEEP-W Compa Two A

Ocean Source W73-02

The Wo

DEFICIE Effect (Cu, 1 Metabo W73-02

DELAWA Automa ty, W73-02

DELTAS Hydron Effects W73-02

DEMONS

Represe Uganda W73-02

| CULTURES | DACE | vysotoy mestnosti i uklonami na rekakh Kar- |
|--|--|--|
| Kinetics of Biologically Mediated Aerobic Ox- | Dace (Leuciscus Leuciscus L.) from the Upper | pat), |
| idation of Organic Compounds in Receiving | Vistula and Czarna Przemsza, | W73-02337 4A |
| Waters and in Waste Treatment, W73-02450 5C | W73-02090 2I | DATA COLLECTIONS |
| W73-02430 SC | DAM CONSTRUCTION | Estuaries, Bays and Coastal Currents Around |
| CULVERTS | Alum Creek Lake, Alum Creek, Scioto River | Puerto Rico, |
| A Nomograph Based on Kinematic Wave | Basin, Ohio (Draft Environmental Impact | W73-01974 5B |
| Theory for Determining Time of Concentration for Overland Flow, | Statement). W73-01986 8A | Water Quality Criteria Data Book - Volume 3: |
| W73-02322 8B | W 75-01500 | Effects of Chemicals on Aquatic Life, Selected |
| 111702322 | Lost Creek Lake Project, Rogue River, Oregon | Data from the Literature Through 1968. |
| CURRENTS (WATER) | (Final Environmental Impact Statement). | W73-01976 5C |
| Estuaries, Bays and Coastal Currents Around | W73-01989 8D | Hydrologic Data Collection Via Geostationary |
| Puerto Rico, W73-01974 SB | Whiteoak Dam and Reservoir, Whiteoak Creek | Satellite, |
| W/3-019/4 3B | Basin, Ohio (Draft Environmental Impact | W73-02036 7A |
| Circulation and Hydrology Under the Seasonal | Statement). | Donnesatetine Dural Catalanante in Venue and |
| Ice in McMurdo Sound, Antarctica, | W73-01990 8A | Representative Rural Catchments in Kenya and Uganda, |
| W73-02051 2C | Boxelder Creek Watershed Project, Colorado | W73-02050 2A |
| The Frequency Distribution of the Current | and Wyoming (Final Environmental Impact | |
| Speed at the Netherlands Lightvessels and Its | Statement). | Bibliography on the Hydrogeology of Siberia |
| Possible Influence on the Composition of Sedi- | W73-02235 4D | and the Soviet Far East for the Period 1918- |
| ments in the Southern North Sea, | With At the Park Court Park Law Court | 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. Bibliograficheskiy ukazatel'. 1918-1965), |
| W73-02155 2J | Highland Lake Fall Creek Basin, Indiana (Draft | W73-02058 2F |
| Sedimentary Evidence of Bottom Current Ac- | Environmental Impact Statement). W73-02253 8D | |
| tivity, Strait of Gibraltar Region, | W. 1.3-02233 | A Dictionary of Hydrogeology and Engineering |
| W73-02496 2J | Pearl River Basin, Edinburg Dam and Lake, | Geology (Slovar' po gidrogeologii i inzhenernoy |
| | Mississippi and Louisiana (Draft Environmen- | geologii), W73-02064 . 10A |
| Transport in the Baroclinic Coastal Current Near the South Shore of Lake Ontario in Early | tal Impact Statement). | W 73-02004 . 10A |
| Summer. | W73-02254 8D | Monitoring New York's Water Automatically, |
| W73-02510 2H | Camp Ground Lake, Salt River Basin, Ken- | W73-02135 5G |
| | tucky (Draft Environmental Impact Statement). | Index of Surface Water Stations in Texas, Oc- |
| CUTTHROAT TROUT | W73-02269 8A | tober 1972. |
| Further Ultrasonic Tracking and Tagging Stu- | Course Creek Beautypie North Oceans Bires | W73-02311 7C |
| dies on Homing Cutthroat Trout (Salmo clarki) in Yellowstone Lake, | Curry Creek Reservoir, North Oconee River, Georgia (Draft Environmental Impact State- | |
| W73-02577 2H | ment). | Low-Flow Study of Streams in Albany County, |
| | W73-02523 8A | New York, W73-02318 7C |
| CUTTINGS | | W 13-02316 |
| Biological Characteristics of Cranberries and | Clinchfield Dam and Reservoir, Broad River Basin, North Carolina and South Carolina | Proposed Experimental Programs for Testing |
| the Problem of Their Cultivation. 1. Effect of Ground Water Level, Sand Layer Thickness | (Draft Environmental Impact Statement). | Remote Sensor Applications in the |
| and Type of Peat on Rootage of Cuttings and | W73-02524 8D | Metropolitan Washington Area, W73-02491 7B |
| Shoot Growth, (In Lithuanian), | | W73-02491 7B |
| W73-02025 3F | DAM STABILITY | Experimental Investigation of the Spatial Form |
| CHARLES OF THE PARTY OF THE PAR | A Theoretical Study of the Pressures Acting on | of Large Internal Waves in a Near-Shore Re- |
| CUTTINGS REMOVAL Carrying Capacity of Drilling Muds, | a Rigid Wall by a Sloping Earth or Rock Fill, W73-02077 8D | gion of Lake Huron, |
| W73-02379 8B | W 13-02011 | W73-02506 2H |
| W15-02515 | DAMAGES | Toward Effective and Equitable Pollution Con- |
| CYANOPHYTA | Conrad V. Board of Supervisors of Lee County | trol Regulation, |
| The Impact of Reduced Light Penetration on a | (Extent of Liability for Pollution of Private | W73-02520 5G |
| Eutrophic Farm Pond, | Pond). | DAMA TAMERANDAN AND A |
| W73-02349 5C | W73-02244 6E | DATA INTERPRETATION The Use of Acoustic Logs in the Evaluation of |
| Characterization of Phenols in Areas of Water | DAMS | Sandstone Reservoirs, |
| 'Blooming' in Open Bodies of Water, | Geology and Dams. Volume IV. | W73-02401 8G |
| W73-02460 5C | W73-02067 8A | P. C. P. P. C. |
| CYCLOTELLA CRYPTICA | Pueblo Dam and Reservoir, Fryingpan-Arkan- | DATA PROCESSING |
| Salinity-Related Polymorphism in the Brackish- | sas Project Colorado (Final Environmental Im- | An Analysis of Forested Watershed Land of the Cape Fear River Basin Using a Computer- |
| Water Diatom Cyclotella Cryptica, | pact Statement). | Oriented Alphanumeric Map Information As- |
| W73-02548 5C | W73-02265 8D | sembly and Display System, |
| | DANIER BEIDE | W73-02358 7C |
| CYCLOTELLA MENEGHINIANA Salinity-Related Polymorphism in the Brackish- | DANUBE RIVER Morphological Characteristic of Aspro Zingel | The Syslab System for Data Analysis of Histor- |
| Water Diatom Cyclotella Cryptica, | (L.) From the Lower Danube, (In Russian), | ical Water-Quality Records (Basic Programs), |
| W73-02548 5C | W73-01998 2I | W73-02437 7C |
| | | |
| CZARNA PRZEMZA | Records About Ecology of Some Characeae | DDE |
| Dace (Leuciscus Leuciscus L.) from the Upper | Species from the Floodplain of the Danube, (In Rumanian). | Accumulations of Certain Pesticides in Adipose Tissues and Performance of Angus, Hereford |
| Vistula and Czarna Przemsza, W73-02090 2I | W73-02249 2I | and Holstein Steers Fed Apple Processing |
| 21 | | Wastes, |
| CZECHOSLOVAKIA | Relation of Ice Freezeup Dates and Ice-Cover | W73-02204 5C |
| Vegetation of the Area of the Future Reservoir | Duration to Elevation and Channel Slopes of | Matabalism of DDT her Peach Water Distance |
| on the Klenovska Rimava, W73-02087 2I | Carpathian Rivers (O svyazi srokov ustanovleniya i prodoizhitel'nosti ledostava s | Metabolism of DDT by Fresh Water Diatoms, W73-02280 SC |
| 11 13 3 2001 21 | astumovicinya i prodominici nosti icdostava s | |

| DDT | DENITRIFICATION | DESIGN STANDARDS |
|---|--|---|
| Transfer of Pesticides Through Water, Sedi- | Control of Nitrate Contamination of Ground | Hydro-Ecological Problems of Marinas in |
| ments and Aquatic Life, | Water Associated with Land Disposal of Mu- | Puget Sound, |
| W73-01959 5B | nicipal Sewage, | W73-02462 5C |
| DDT Residues in Coastal Marine Phytoplank- | W73-02111 5B | PROTEST OF BRIDGE BEING AND |
| ton and Their Transfer in Pelagic Food Chains, | Groundwater Recharge and Quality Transfor- | DESULFLOVIBRIO DESULFURICANS |
| W73-02105 5C | mations During Initiation of a New Sewage Sta- | Microbiological Corrosion in Water Floods, W73-02404 |
| W 15-02105 | bilization Pond (and Management), | W73-02404 8G |
| Accumulations of Certain Pesticides in Adipose | W73-02438 5B | DETECTION LIMITS |
| Tissues and Performance of Angus, Hereford | | Development of a Tape Transport Bacterial De- |
| and Holstein Steers Fed Apple Processing | DENTON COUNTY (TEX) | tection System; Final Report, |
| Wastes, | Annual Compilation and Analysis of Hydrolog- | W73-02012 5A |
| W73-02204 5C | ic Data for Little Elm Creek, Trinity River | JA |
| Metabolism of DDT by Fresh Water Diatoms, | Basin, Texas, 1970, | DETECTION TECHNIQUES |
| W73-02280 5C | W73-02324 7C | A Simple Apparatus for Measuring Activity |
| W13-02200 | DEPOSITION (CHEMICAL) | Patterns of Fishes, |
| DECISION MAKING | Secondary Deposition of Iron Compounds Fol- | W73-01977 5A |
| Manager's Role in the Decision Making | lowing Acidizing Treatments, | DETERMENTS |
| Process, | W73-02420 8G | DETERGENTS Toxicological Studies on Emulsions for the |
| W73-02127 6B | | Combatting of Oil Pollution (Toxikologische |
| Periode and Manager for Post Const. | DEPOSITION (SEDIMENTS) | Untersuchung Von Emulgatoren Fuer Die |
| Environmental Management for Puget Sound: Certain Problems of Political Organization and | A Random-Walk Simulation Model of Alluvial | Bekaempfung Von Oelverschmutzungen), |
| Alternative Approaches, | Fan Deposition, | W73-02281 SC |
| W73-02251 6E | W73-02342 2J | W 75-02201 |
| W 13-02231 | TOTAL PROPERTY. | Technical Evaluation of Phosphate-Free Home |
| Watershed Project Evaluation Involving Multi- | DESALINATION | Laundry Detergents, |
| ple Social Objectives, | Concentration of Brines by Spray Evaporation, | W73-02351 5C |
| W73-02348 6B | W73-02081 5E | |
| | Further Studies of Optimum Operation of | DETERMINISTIC MODELS |
| Courts and Water, The Role of the Judicial | Desalting Plants as a Supplemental Source of | Hydrologic Modeling, |
| Process, | Firm Yield, | W73-02547 2A |
| W73-02365 6E | W73-02082 3A | DETROIT |
| Water Resource Planning. | | Information on the Velocity and Flow Pattern |
| W73-02368 6B | Optimum Conjunctive Use of a Dual-Purpose | of Detroit River Water in Western Lake Erie |
| | Desalting Plant and Multi-Purpose Surface | Revealed by an Accidental Salt Spill, |
| Modeling and Sensitivity Analysis for Planning | Water Reservoirs, | W73-02057 5B |
| Decisions in Water Resources Expansion, | W73-02083 3A | 35 |
| W73-02541 4A | Studies of the Effect of Desalinated Drinking | DEVELOPED ZONE |
| DEEP PERCOLATION | Water on the Functional State of the Organism, | Development Work is Essential. |
| Groundwater Recharge and Quality Transfor- | W73-02091 5F | W73-02109 8B |
| mations During Initiation of a New Sewage Sta- | | |
| bilization Pond (and Management), | Water Desalting, Present and Future, | DEVON ISLAND (CANADA) |
| W73-02438 5B | W73-02131 3A | Some Observations on Superimposition of Ice |
| | | on the Devon Island Ice Cap, N.W.T., Canada, |
| DEEP-WATER HABITATS | DESALINATION PLANTS | W73-02046 2C |
| Comparison of Benthic Infaunal Abundance on | Water Desalting, Present and Future, | DEWATERING |
| Two Abyssal Plains in the Northeast Pacific | W73-02131 3A | Treatment of Waste Sludges from Water Purifi- |
| Ocean with Comments on Deep-Sea Food | DESALINATION PROCESSES | cation Plants, |
| Sources, | Water Desalting, Present and Future, | W73-01964 SF |
| W73-02017 5A | W73-02131 3A | |
| DEEP WELLS | 38 | Mechanisms of Change in Activated Sludge De- |
| The World's Deepest Cable Tool Well, | DESALTING PLANTS | waterability During Aerobic Digestion, |
| W73-02388 8B | Further Studies of Optimum Operation of | W73-02362 5D |
| | Desalting Plants as a Supplemental Source of | DIAMOND DRILLING |
| DEFICIENT ELEMENTS | Firm Yield, | Full Core Recovery in Unconsolidated Forma- |
| Effect of Dietry Deficiency of Trace Elements | W73-02082 3A | tions, |
| (Cu, Mo, Mn) on Water and Electrolyte | DESIGN | W73-02390 8G |
| Metabolism, | Marine Aids to Navigation - Selection and | 117502550 |
| W73-02086 5C | Design, | DIATOMACEOUS EARTH |
| DELAWARE RIVER BASIN | W73-02463 5C | Anion Exchange and Filtration Techniques for |
| Automatic System for Monitoring Water Quali- | | Wastewater Renovation, |
| | DESIGN CAPACITY | W73-02537 5D |
| ty, W73-02432 5A | Evaluating Economy of Scale, | DV A TROUBE |
| | W73-02542 5D | DIATOMS |
| DELTAS | DESIGN COFFESIA | Diatoms from Seven Iowa Rivers, |
| Hydrometeorological Relationships and Their | DESIGN CRITERIA | W73-02011 2I |
| Effects on the Levees of a Small Arctic Delta, | Design Considerations for Large Treatment | Metabolism of DDT by Fresh Water Diatoms, |
| W73-02041 8D | Plants. W73-02213 5D | W73-02280 5C |
| DEMONSTRATION WATERSHEDS | H / 3-02213 | 30 |
| Representative Rural Catchments in Kenya and | Hydro-Ecological Problems of Marinas in | Salinity-Related Polymorphism in the Brackish- |
| Uganda, | Puget Sound, | Water Diatom Cyclotella Cryptica, |
| W73-02050 2A | W73-02462 5C | W73-02548 SC |

| DICTIONARIES | |
|---|--|
| DICTIONARIES | Experiences with Wastewater Disinfection in |
| A Dictionary of Hydrogeology and Engineering | California, |
| Geology (Slovar' po gidrogeologii i inzhenernoy | W73-02539 5D |
| geologii), W73-02064 10A | DISPERSAL (FAUNA) The Principle of Dispersal of the Subterranean |
| DIELDRIN | Psammon at the Transition Between Seawater |
| Transfer of Pesticides Through Water, Sedi- | and Freshwater, |
| ments and Aquatic Life, | W73-02599 2L |
| W73-01959 5B | DISPERSION |
| DIETS | Analysis of Thermal Pollution Dispersion, |
| Growth Responses of Young Sockeye Salmon | W73-01962 5B |
| (Oncorhynchus nerka) to Different Diets and | Efficiency and Utility of Collocation Methods |
| Planes of Nutrition, W73-02571 8I | in Solving the Performance Equations of Flow Chemical Reactors with Axial Dispersion, |
| MIPPE /PICIF | W73-02552 5D |
| DIETS (FISH) Feeding, Dietary Interrelationships of Fish and | (American) (Carlotter) |
| the Effectiveness of Their Use of Food | DISPOSAL |
| Resources in Natural Bodies of Water in the | A Study of Sediments from Bellingham Harbor |
| Byelorussian Polesya. II. Diet of Goldfish in | as Related to Marine Disposal, W73-02461 5C |
| Lakes, | |
| W73-02590 2H | DISSOLVED OXYGEN |
| DIFFUSION | A Study of the Effects of Island Development |
| Note on the Finite Element Solution of the Dif- | on Lake Water Quality, W73-01954 5C |
| fusion-Convection Equation, | W13-01334 |
| W73-02338 2E | Optical Signatures of the Near-Shore Waters of |
| An Investigation of Horizontal Diffusion in | Southern Monterey Bay, |
| Lake Ontario. | W73-02027 5A |
| W73-02507 2H | Hypolimnion Aeration, |
| | W73-02137 5F |
| DIFFUSION MODELS | A Quantitative Evaluation of Dissolved Oxygen |
| Efficiency and Utility of Collocation Methods in Solving the Performance Equations of Flow | Instrumentation, |
| Chemical Reactors with Axial Dispersion, | W73-02165 5B |
| W73-02552 5D | |
| 100 A 160 | Effects of Handling and Salinity on Oxygen |
| DIFFUSIVITY | Requirements of the Striped Bass, Morone Saxatilis, |
| Diffusivity of Suspended Matter in the Carib- bean Sea, | W73-02435 5C |
| W73-02171 2J | STATE OF PRINCIPLE STATE OF THE PRINCIPLE STA |
| | DISSOLVED OXYGEN ANALYZERS |
| DIGITAL MODELS | A Quantitative Evaluation of Dissolved Oxygen Instrumentation. |
| A Random-Walk Simulation Model of Alluvial | W73-02165 5B |
| Fan Deposition, W73-02342 2J | The state of a living to the state of |
| W15-025-E | DISTRIBUTION (FISH) |
| DILATOMETRY | Distribution of Fish in the Volgograd Reser- voir, (In Russian), |
| Structural Aspects of Amide-Water Systems, | W73-02591 2H |
| W73-02343 5A | |
| DIOR SOILS | DISTRIBUTION PATTERNS |
| Contribution to the Study of Nitrogen Leaching | Radionuclides in Transport in the Columbia River from Pasco to Vancouver, Washington, |
| in a Sandy Soil ('Dior') in Senegal, | W73-02022 5B |
| W73-02161 5G | Settler Solve At Dynamic December 14 |
| DISCHARGE MEASUREMENT | DISTRIBUTION SYSTEMS |
| Readers Comment on Step Drawdown Test, | Water Quality Changes in the Distribution System, |
| W73-02419 8G | W73-02430 5F |
| DECOTA DOD ON A SERVICE | |
| DISCHARGE (WATER) Runoff Coefficients for Areas Between | DIURNAL |
| Isochrones (O koeffitsiyentakh yestestvennogo | An Estimate of Primary Productivity in a Pennsylvania Trout Stream Using a Diurnal |
| zaregulirovaniya stoka na mezhizokhronnykh | Oxygen Curve Technique, |
| uchastkakh), | W73-02030 5A |
| W73-02331 4A | |
| DISINFECTION | DIVERSION Inventory of Water Diversions and Rate Struc- |
| Disinfection of Drinking Water Containing En- | tures for Cities, Towns, and Villages in New |
| teroviruses with Electrolytic Products of Com- | Mexico, |
| mon Salt, | W73-01963 6C |
| W73-02089 5F | Gregory V. City of New York (Non-Resident |
| Effect of Lime-Treated Water Upon Survival | Riparian Landowner's for Upstream Diversion |

5F

| Experiences with Wastewater Disinfection in California, W73-02539 5D |
|---|
| |
| ISPERSAL (FAUNA) The Principle of Dispersal of the Subterranean Psammon at the Transition Between Seawater |
| and Freshwater, W73-02599 2L |
| ISPERSION |
| Analysis of Thermal Pollution Dispersion, W73-01962 5B |
| Efficiency and Utility of Collocation Methods in Solving the Performance Equations of Flow Chemical Reactors with Axial Dispersion, |
| W73-02552 5D |
| OISPOSAL A Study of Sediments from Bellingham Harbor |
| as Related to Marine Disposal, |
| W73-02461 5C |
| DISSOLVED OXYGEN |
| A Study of the Effects of Island Development on Lake Water Quality, |
| W73-01954 5C |
| Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, |
| W73-02027 5A |
| Hypolimnion Aeration, W73-02137 SF |
| A Quantitative Evaluation of Dissolved Oxygen |
| Instrumentation, W73-02165 5B |
| |
| Effects of Handling and Salinity on Oxygen Requirements of the Striped Bass, Morone Saxatilis. |
| W73-02435 5C |
| DISSOLVED OXYGEN ANALYZERS A Quantitative Evaluation of Dissolved Oxygen |
| Instrumentation, |
| W73-02165 5E |
| DISTRIBUTION (FISH) Distribution of Fish in the Volgograd Reser- |
| voir, (In Russian), W73-02591 2H |
| |
| PARTIEUTION PATTERNS Radionuclides in Transport in the Columbia |
| River from Pasco to Vancouver, Washington, W73-02022 5E |
| DISTRIBUTION SYSTEMS |
| Water Quality Changes in the Distribution System, |
| W73-02430 5F |
| DIURNAL |
| An Estimate of Primary Productivity in a Pennsylvania Trout Stream Using a Diurna Oxygen Curve Technique, |
| W73-02030 5A |
| DIVERSION |
| Inventory of Water Diversions and Rate Structures for Cities, Towns, and Villages in New |
| Mexico, W73-01963 60 |
| Gregory V. City of New York (Non-Residen |
| Riparian Landowner's for Upstream Diversion by Municipality). W73-02239 6I |
| |

| INDEX | |
|--|---|
| tewater Disinfection in | |
| 5D | |
| | I |
| sal of the Subterranean tion Between Seawater | |
| 2L | 1 |
| llution Dispersion, | |
| 5B | |
| of Collocation Methods ance Equations of Flow | |
| Axial Dispersion, 5D | |
| | |
| rom Bellingham Harbor sposal, | 1 |
| 5C | • |
| of Island Development | |
| 5C | |
| e Near-Shore Waters of | |
| 5A | |
| 5F | |
| on of Dissolved Oxygen | 1 |
| 5B | |
| nd Salinity on Oxygen Striped Bass, Morone | |
| | 1 |
| 5C NALYZERS | |
| ion of Dissolved Oxygen | |
| 5B | 1 |
| n the Volgograd Reser- | |
| 2Н | |
| RNS | |
| sport in the Columbia incouver, Washington, | |
| 5B | 1 |
| es in the Distribution | |
| 5F | |
| nary Productivity in a | |
| tream Using a Diurnal | 1 |
| 5A | |
| versions and Pate Struc- | |
| is, and Villages in New | |
| 6C | |

| 1 | Preliminary Analysis of Surface Water Availability. |
|---|---|
|) | W73-02544 4A |
| | DIVERSION DAMS |
| 1 | Newhalem Creek Project, Washington (Draft |
| r | Environmental Impact Statement). W73-02522 8C |
| | DNIEPER RIVER |
| | Protection of Water Sources in the Lower Dnieper River Basin (Okhrana vodnykh |
| 3 | istochnikov v basseyne Nizhnego Dnepra), W73-02329 4A |
| 8 | Form of the Relation Between Melt-Water |
| V | Losses and Some Hydrologic Characteristics |
|) | (O vozmozhnoy forme zavisimosti poter' ta- lykh vod ot nekotorykh obuslovlivayushchikh faktorov). |
| r | W73-02332 2E |
| , | DNIESTER RIVER |
| - | Annual Streamflow Fluctuations in the Dni- |
| | ester River Basin (Kolebaniya godovogo stoka |
| t | rek basseyna Dnestra), W73-02335 4A |
| | W 73-02333 |
| - | Relation of Ice Freezeup Dates and Ice-Cover |
| £ | Duration to Elevation and Channel Slopes of |
| | Carpathian Rivers (O svyazi srokov |
| 1 | ustanovleniya i prodoizhitel'nosti ledostava s vysotoy mestnosti i uklonami na rekakh Kar- |
| | pat), |
| F | W73-02337 4A |
| | DOCUMENTATION A Dictionary of Hydrogeology and Engineering |
| | Geology (Slovar' po gidrogeologii i inzhenemoy |
| В | geologii), |
| n | W73-02064 10A |
| e | PLOS EDIOMECI EN LORDO |

| pat), | | |
|----------------------|--------------------------|-------------|
| W73-02337 | | 4A DRAWD |
| | | Rodma |
| DOCUMENTATION | | W73-02 |
| A Dictionary of Hydr | rogeology and Engineer | ring |
| | ridrogeologii i inzhener | |
| geologii), | 7 | sian W |
| W73-02064 | 1 | 10A W73-02 |
| DOMESTIC WASTES | | Relatio |
| Determination of the | Rate of Biodegradatio | n in Mechai |
| | ical Waters and in Se | ome W73-02 |

DRAINA

Spain Dama W73-0

McCa for Al W73-0

DRAINA Re-evi Stream W73-0

DRAINA

Spain Damag W73-0

DRAINA Taylor Contro Statem

W73-0

Drain :

W73-0

Reader W73-0 DREDGI Militar Carolin ment). W73-01

Port Califor ment). W73-01

Hemps ject (D W73-01

Dredgir Lakepo Chattal mental W73-02

Bucks

vironm W73-02

Mainte bor, M pact St W73-02

A Stud as Reia W73-02

DRAINS Uplift W73-0

| | | of Biodeg Waters an | |
|---------|-----|------------------------|----|
| | | Common | |
| W73-019 | 773 | 1 | 5B |

| Inventory | | | sion | and Rat | te Struc- |
|-------------|---------|--------|------|----------|-----------|
| tures for (| Cities, | Towns, | and | Villages | in New |
| W73-01963 | | | 1. | | 6C |

| A Statistical Study | | | |
|---------------------|--------|---------|-----------|
| trolytes, Mixing a | and pH | Upon an | Activated |
| W73-02221 | | 17.4 | 5D |

| DON RIVER (FLOODPLAINS) | |
|--|--------|
| The Effect of Soil and Hydrological Con | dition |
| on the Settlement and Productivity of Tr | ee an |
| Shrub Vegetation of Don River Floodpla | in, (I |
| Russian). | -11 |
| W72 02100 | 4.1 |

| DRAGOUT Saving the Discharge L | | Keeps | Plater | Within |
|--------------------------------------|--------|-------|--------|--------|
| W73-02227 | annts, | | | , 5D |
| | | | | |

| Water Temperature | in | the | Steamboat | Drainage, |
|-------------------|----|-----|------------|-----------|
| W73-02567 | | | (allers of | 40 |

| A Program | | ting Run | off from Ir | diana |
|-------------|------------|----------|---------------|-------|
| | s. Part | | | |
| Geomorph | ologic Dat | a and a | Dynamic | Con- |
| tributing A | rea Model | for Runo | ff Estimation | on, |
| W73-01952 | | | | 2A |

of Bacteria, W73-02148

| DRAINAGE EFFECTS Spain V. Cape Girardeau (Surface Water | Saint Catherine Sound, Maryland (Maintenance Dredging) (Final Environmental Impact State- | DYE DISPERSION An Investigation of Horizontal Diffusion in |
|--|--|--|
| Damage Caused by Street Resurfacing). W73-02241 6E | ment). W73-02516 4A | Lake Ontario, W73-02507 2H |
| The state of the s | Miami Harbor, Florida, Navigation (Final En- | and the state of t |
| McCarthy V. Cullen and Son Corp. (Liability for Alteration of Surface Water Drainage). W73-02245 6E | vironmental Impact Statement). W73-02517 8A | DYE RELEASES An Investigation of Horizontal Diffusion in Lake Ontario, |
| A CONTRACTOR OF THE PROPERTY O | DRILL-STEM TESTING | W73-02507 2H |
| DRAINAGE PATTERNS (GEOLOGIC) Re-evaluation of the Relationship of Master Streams and Drainage Basins, | Special Application of Drill-Stem Test Pressure Data, | DYNAMIC PROGRAMMING Optimization of Water Resources Develop- |
| W73-02488 2J | W73-02383 8G | ment: Optimization of Capacity Specifications |
| DRAINAGE PRACTICES Spain V. Cape Girardeau (Surface Water | The World's Deepest Cable Tool Well, W73-02388 8B | for Components of Regional, Complex In- tegrated, Multipurpose Water Resources Systems, |
| Damage Caused by Street Resurfacing). W73-02241 6E | Some Results of Dri Investigations-Rock | W73-01970 6A |
| DRAINAGE SYSTEMS | Failure in Percussion, W73-02406 8E | Development of a Tape Transport Bacterial De- |
| Taylors Bayou, Texas, Drainage and Flood Control Project (Final Environmental Impact | DRILLING EQUIPMENT | tection System; Final Report, W73-02012 5A |
| Statement). | Notes on the Early History of Water-Well | E Cali as an Indicator Opposium for Disinfor |
| W73-02230 8A | Drilling in the United States, W73-02376 8B | E. Coli as an Indicator Organism for Disinfec- tion of Water with Respect to Enteroviruses |
| Drain and Irrigate with the Same System, W73-02353 3F | The World's Deepest Cable Tool Well, | Under Various Conditions, W73-02085 5F |
| DRAINS | W73-02388 8B | Biological Effects of Trinitrotoluene (TNT), |
| Uplift Computations for Masonry Dams, W73-02080 8A | Full Core Recovery in Unconsolidated Forma- tions, | W73-02101 5C |
| DRAWDOWN | W73-02390 8G | Eagle-Tumbleweed Draw Watershed, New |
| Rodman Drawdown Saves Trees, | Cable Tool Drilling, An Investigation of the Relation Between the Natural Stroke Frequen- | Mexico (Draft Environmental Impact State- ment). |
| W73-02258 6E | cies of Cable-tool Systems and the Operating | W73-01985 4D |
| Finite Element Analysis of Flow Toward Arte- sian Well. | Strokes per Minute, W73-02407 8G | EARTH RESOURCES TECHNOLOGY |
| W73-02340 2F | DRILLING FLUIDS | SATELLITE (ERTS) Proposed Experimental Programs for Testing |
| Relation of Screen Design to the Design of | Development Work is Essential. W73-02110 8B | Remote Sensor Applications in the Metropolitan Washington Area, |
| Mechanically Efficient Wells, W73-02410 8B | Carrying Capacity of Drilling Muds, | W73-02491 7B |
| Readers Comment on Step Drawdown Test, | W73-02379 8B | EASEMENTS Louisiana Irrigation and Mill Co. V. Pousson |
| W73-02419 8G | Volume Requirements for Air or Gas Drilling, W73-02381 8B | (Injunctive Relief to Protect and Aqueduct Servitude). |
| DREDGING Military Ocean Terminal, Sunny Point, North | Special Application of Drill-Stem Test Pressure | W73-02236 6E |
| Carolina (Draft Environmental Impact State- ment). | Data, W73-02383 8G | ECOLOGICAL DISTRIBUTION |
| W73-01981 4A | Filtrate Invasion in Highly Permeable Sands, | Comparison of Benthic Infaunal Abundance on Two Abyssal Plains in the Northeast Pacific |
| Port Hueneme Harbor, Ventura County, | W73-02422 8B | Ocean with Comments on Deep-Sea Food Sources. |
| California (Draft Environmental Impact Statement). | DROUGHT | W73-02017 5A |
| W73-01984 8A | After Effect of Atmospheric Drought of Coupling of Oxidation and Phosphorylation | Aquatic Insects of the Pine-Popple River, |
| Hempstead Harbor, New York Navigation Pro- | Processes in the Leaves of Bean Plants with Different Drought-Resistance (In Russian), | Wisconsin, W73-02097 SC |
| ject (Draft Environmental Impact Statement). W73-01995 | W73-02134 3F | Ecosystem Structure and Function. |
| Dredging and Filling, Cowikeee State Park, | DROUGHT TOLERANCE | Proceedings of the Thirty-First Annual Biology |
| Lakepoint Resort, Walter F. George Lake, Chattahoochee River, Alabama (Draft Environ- | Physiological Aspects of the Water Regime of Plants as Related to Drought Resistance Stu- | Colloquium. W73-02124 5C |
| mental Statement). W73-02233 4A | dies of Some Oil Crops, (In Russian), W73-02013 3F | ECOLOGY Ecological Effects of Offshore Construction, |
| | DROUGHTS | W73-02029 5C |
| Bucks Harbor, Machiasport, Maine (Final Environmental Impact Statement). | Alternative Adjustments to Natural Hazards, W73-02367 6F | The Structure and Function of Fresh-Water |
| W73-02234 8A | DRY WEIGHT BIOMASS | Microbial Communities. W73-02095 5C |
| Maintenance Dredging, Chatham (Stage) Har- | Pollution and the Ecology of Nearshore | |
| bor, Massachusetts (Draft Environmental Impact Statement). | Periphyton of Lake Superior: The Effects of Calefaction on Periphyton, | Environmental Quality. A Challenge for Achievement, W73-02485 5G |
| W73-02262 4A | W73-02556 5C | |
| A Study of Sediments from Bellingham Harbor as Related to Marine Disposal, | DUNES The Evolution of Coastal Sand Dunes, | EVALUATING Economy of Scale, |
| W73-02461 5C | W73-02035 2J | W73-02542 5D |

Content pared v from th W73-02

Toxicol Combat Untersu Bekaem W73-02

Effects Distribu W73-02

END MOI Glacial-W73-02

Hydrau Trap Ac W73-02

ENGINEE Enginee siologiy W73-02

Recent Science W73-02 ENGINES A Dicti Geologi geologii W73-02

Geology W73-02

Radiois gineerin (Radiois henerno W73-02

ENGINEE Enginee siologiy W73-02 ENGINEE Geology W73-02

A Unifi Mixing-W73-02

A Non Theory for Ove W73-02:

E. Coli tion of Under V W73-020

Relation Mechan W73-024

ECONOMIC EFFICIENCY

| ECONOMIC EFFICIENCY | Ontimization of Water Becommes Develop | Newington, New Hampshire (Draft Environ- |
|---|--|--|
| Power, Pollution, and Public Policy, Issues in Electric Power Production, Shoreline Recrea- | Optimization of Water Resources Develop- ment: Optimization of Capacity Specifications | mental Impact Statement). |
| tion, and Air and Water Pollution Facing New | for Components of Regional, Complex In- | W73-02514 8C |
| England and the Nation. | tegrated, Multipurpose Water Resources | |
| W73-02299 6G | Systems, | ELECTRIC POWERPLANTS |
| W 13-02277 | W73-01970 6A | Newington Generating Station Unit No. 1, |
| The Framework for Analysis, | WIS-OLDIO GIA | Newington, New Hampshire (Draft Environ- |
| W73-02300 6G | EFFLUENT CHARGES | mental Impact Statement). |
| | The Effects of Sewer Surcharges on the Level | W73-02514 8C |
| Regional Government in New England: A | of Industrial Wastes and the Use of Water by | |
| Prototype, | Industry, | ELECTRICAL WELL LOGGING |
| W73-02304 6G | W73-02115 5G | The Electric Log: Geophysics' Contribution to |
| ECONOMIC INCENTIVE | | Ground Water Prospecting and Evaluation, |
| The Effects of Sewer Surcharges on the Level | User Charges as a Means for Pollution Control: | W73-02373 4B |
| of Industrial Wastes and the Use of Water by | The Case of Sewer Surcharges, | Cement Bond Logging, an Aid to Better |
| Industry, | W73-02359 5G | Completion Practices, |
| W73-02115 5G | 00 | W73-02385 8F |
| 11.5 42.15 | Sewer Surcharges and Their Effect on Water, | 1175-02505 |
| ECONOMIC INCENTIVES | W73-02360 5G | Electrical Well Logging Fundamentals, |
| User Charges as a Means for Pollution Control: | The Industrial Demand for Water and Waste | W73-02392 8B |
| The Case of Sewer Surcharges, | Treatment in Selected U.S. Cities Which are | |
| W73-02359 5G | Levying Surcharges, | Electric Logging Applied to Ground Water Ex- |
| | W73-02361 5G | ploration, |
| Sewer Surcharges and Their Effect on Water, | W73-02501 , 3G | W73-02402 . 8G |
| W73-02360 5G | EFFLUENT STANDARDS | MI DOWN COMMANDE |
| The Industrial Demand for Water and Waste | The Ministry's Memorandum on 'Standards of | ELECTROCHEMISTRY |
| | Effluents to Rivers With Particular Reference | Microbiological Corrosion of Iron and Steel, |
| Treatment in Selected U.S. Cities Which are | to Industrial Effluents': A Review, | W73-02403 8G |
| Levying Surcharges, W73-02361 5G | W73-02228 5G | ELECTRODEPOSITION PROCESS |
| W73-02361 5G | | |
| ECONOMICS | EGYPT | Flow Ultrafiltration Benefits Equipto, W73-02205 5D |
| User Charges as a Means for Pollution Control: | Geochemistry of Ground Waters from Burg El- | W/3-02203 |
| The Case of Sewer Surcharges, | Arab Area, Egypt, | ELECTROLYSIS |
| W73-02359 5G | W73-02053 2K | Disinfection of Drinking Water Containing En- |
| 1175 02257 | | teroviruses with Electrolytic Products of Com- |
| Sewer Surcharges and Their Effect on Water, | EICHHORNIA CRASSIPES | mon Salt. |
| W73-02360 5G | Nutrient Removal by Waterhyacinth, | W73-02089 5F |
| | W73-02122 5G | 11.13 02003 |
| Economic Analysis of Alternative Water Pollu- | The same of the sa | ELECTROLYTES |
| tion Control Measures, | ELASTICITY OF DEMAND | The Effects of Divalent Metal Ions on the |
| W73-02550 5G | The Effects of Sewer Surcharges on the Level | Micellar Properties of Sodium Dodecyl Sulfate, |
| BOONOLING OF COALE | of Industrial Wastes and the Use of Water by | W73-02557 2K |
| ECONOMIES OF SCALE | Industry, | A Mark to the state of the company of the land |
| Economic Analyses of Optimal Water Quality | W73-02115 5G | ELECTRON CAPTURE GAS |
| Management, W73-01951 5G | | CHROMATOGRAPHY *BIOLOGICAL |
| W/3-01931 3G | User Charges as a Means for Pollution Control: | MAGNIFICATION |
| Regional Management of Water Supply and | The Case of Sewer Surcharges, | DDT Residues in Coastal Marine Phytoplank- |
| Wastewater Disposal Facilities, | W73-02359 5G | ton and Their Transfer in Pelagic Food Chains, |
| W73-02354 6B | Sewer Surcharges and Their Effect on Water, | W73-02105 5C |
| | W73-02360 5G | ELECTROPHORESIS |
| Evaluating Economy of Scale, | W 75-02500 3G | Magnesium Carbonate: A Recycled Coagulant - |
| W73-02542 5D | The Industrial Demand for Water and Waste | II, |
| CONTRACTOR | Treatment in Selected U.S. Cities Which are | W73-02145 5F |
| ECOSYSTEMS | Levying Surcharges, | # /3-02143 SF |
| An Ecosystematic Study of the South River, | W73-02361 5G | ELEMENTAL COMPOSITION |
| Virginia, | | Elemental Composition of the Estuarine |
| W73-01972 5C | ELECROANALYSIS | Teleost Fundulus Heteroclitus (L.), |
| A Method of Mathematical Modeling of Com- | Mobilities of Injected Ions in Liquid Water, | W73-02278 5C |
| plex Ecological Systems, | W73-02114 5A | |
| W73-02032 5B | | ELEMENTS (CHEMICAL) |
| W 13-02032 3B | ELECTRIC POWER | Elemental Composition of the Estuarine |
| Ecosystem Structure and Function. | Offshore Siting of Electric Power Plants, | Teleost Fundulus Heteroclitus (L.), |
| Proceedings of the Thirty-First Annual Biology | W73-02301 6G | W73-02278 5C |
| Colloquium. | W ROWNIA BOWER WINDOWN | PI PULTION |
| W73-02124 5C | ELECTRIC POWER INDUSTRY | ELEVATION |
| | Offshore Siting of Electric Power Plants, | Relation of Ice Freezeup Dates and Ice-Cover |
| EDINBURG DAM AND LAKE | W73-02301 6G | Duration to Elevation and Channel Slopes of |
| Pearl River Basin, Edinburg Dam and Lake, | ELECTRIC POWER PRODUCTION | Carpathian Rivers (O svyazi srokov |
| Mississippi and Louisiana (Draft Environmen- | | ustanovleniya i prodoizhitel'nosti ledostava s |
| tal Impact Statement). | Power, Pollution, and Public Policy, Issues in | vysotoy mestnosti i uklonami na rekakh Kar- |
| W73-02254 8D | Electric Power Production, Shoreline Recrea- | pat), |
| EDUCATION | tion, and Air and Water Pollution Facing New | W73-02337 . 4A |
| Evaluation of Selected Aspects of Communica- | England and the Nation. W73-02299 6G | EMINENT DOMAIN |
| tion of Water Resources Research Information | #13-02239 OU | Pigorsh V. Fahner (Exclusive Use of Privately |
| Among University Researchers and Users, | Offshore Siting of Electric Power Plants, | Owned Lake). |
| W73-02357 6B | W73-02301 6G | W73-02531 6E |
| | | |
| | | |

| EMS RIVER Contents and Behaviour of Mercury as Compared with Other Heavy Metals in Sediments | ENVIRONMENTAL CONTROL Surface Waters of a Small City (Springfield, Mass), | (Santa Rosa, Sonoma County, California, Sewer Collection and Water Distribution System), (Draft Environmental Impact State- |
|---|---|---|
| from the Rivers Rhine and Ems, | W73-01961 6G | ment). |
| W73-02158 5B | Environmental Quality. A Challenge for | W73-01996 3D |
| EMULSIFIERS Toxicological Studies on Emulsions for the | Achievement, W73-02485 5G | Ecological Effects of Offshore Construction, W73-02029 5C |
| Combatting of Oil Pollution (Toxikologische | Toward Effective and Equitable Pollution Con- | Ecosystem Structure and Function. |
| Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C | trol Regulation, W73-02520 5G | Proceedings of the Thirty-First Annual Biology Colloquium. |
| | ENVIRONMENTAL CONTROL | W73-02124 5C |
| EMULSIONS Effects of Long Chain Polymers on the Size | ADMINISTRATION Environmental Control Administration Water | Physical-Chemical Crisis Indicators—Are There Any, |
| Distribution of Oil-In-Water Emulsions, W73-02120 5G | Hygiene Programs, W73-02125 5G | W73-02150 5A |
| | | Effects of Skylight Polarization, Cloudiness, |
| END MORAINES Glacial-Drift Gas in Illinois. | ENVIRONMENTAL DEFENSE FUND Defending the Environment—A Case History, | and View Angle on the Detection of Oil on Water, |
| W73-02391 8D | W73-02250 6E | W73-02183 5A |
| ENERGY DISSIPATION | ENVIRONMENTAL EFFECTS | The Forest Overstory Vegetation on the Mis- |
| Hydraulic Model Studies of Scoggins Dam Fish | Construction of Wastewater Facilities, Austin, Texas (Final Environmental Impact Statement). | souri River Floodplain in North Dakota, W73-02185 4A |
| Trap Aerator and Supply Structure, W73-02069 81 | W73-01980 5D | Taylors Bayou, Texas, Drainage and Flood |
| ENGINEERING | Military Ocean Terminal, Sunny Point, North | Control Project (Final Environmental Impact |
| Engineering Glaciology (Inzhenernaya glyat- | Carolina (Draft Environmental Impact State- ment). | Statement). W73-02230 8A |
| siologiya). W73-02060 2C | W73-01981 4A | Proposed Principles and Standards for Planning |
| Recent Federal Policies Affecting Marine | Port Hueneme Harbor, Ventura County, | Water and Related Land Resources. |
| Science and Engineering Development, | California (Draft Environmental Impact State- ment). | W73-02231 6E |
| W73-02466 5C | W73-01984 8A | Dredging and Filling, Cowikeee State Park, Lakepoint Resort, Walter F. George Lake, |
| ENGINEERING GEOLOGY | Eagle-Tumbleweed Draw Watershed, New | Chattahoochee River, Alabama (Draft Environ- |
| A Dictionary of Hydrogeology and Engineering Geology (Slovar' po gidrogeologii i inzhenernoy | Mexico (Draft Environmental Impact State- ment). | mental Statement). W73-02233 4A |
| geologii), W73-02064 10A | W73-01985 4D | Bucks Harbor, Machiasport, Maine (Final En- |
| | Alum Creek Lake, Alum Creek, Scioto River | vironmental Impact Statement). |
| Geology and Dams. Volume IV. W73-02067 8A | Basin, Ohio (Draft Environmental Impact Statement). | W73-02234 8A |
| Radioisotope Investigation Techniques in En- | W73-01986 8A | Boxelder Creek Watershed Project, Colorado and Wyoming (Final Environmental Impact |
| gineering Geology and Hydrogeology (Radioizotopnyye metody issledovaniya v inz- | Lytle and Warm Creeks, San Bernardino Coun- ty, California (Final Environmental Impact | Statement). W73-02235 4D |
| henernoy geologii i gidrogeologii), W73-02328 8G | Statement). W73-01987 8A | Sierra Club V. Froehlke (Judicial Review of |
| | Ririe Dam and Lake, Willow Creek, Idaho | Environmental Impact Statement). W73-02238 6E |
| ENGINEERING GLACIOLOGY Engineering Glaciology (Inzhenernaya glyat- | (Draft Environmental Impact Statement). | Highland Lake Fall Creek Basin, Indiana (Draft |
| siologiya). | W73-01988 8D | Environmental Impact Statement). |
| W73-02060 2C | Lost Creek Lake Project, Rogue River, Oregon (Final Environmental Impact Statement). | W73-02253 8D |
| ENGINEERING STRUCTURES Geology and Dams. Volume IV. | W73-01989 8D | Pearl River Basin, Edinburg Dam and Lake, Mississippi and Louisiana (Draft Environmen- |
| W73-02067 8A | Whiteoak Dam and Reservoir, Whiteoak Creek Basin, Ohio (Draft Environmental Impact | tal Impact Statement). W73-02254 8D |
| A Unified View of the Law of the Wall Using | Statement). | Hamlin Beach State Park Cooperative Beach |
| Mixing-Length Theory, W73-02306 8B | W73-01990 8A | Erosion Control Project, Lake Ontario, Mon- |
| | Local Protection and Floodproofing Project, Matewan, West Virginia, Tug Fork of Big | roe County, New York (Draft Environmental Impact Statement). |
| A Nomograph Based on Kinematic Wave Theory for Determining Time of Concentration | Sandy River (Draft Environmental Impact | W73-02261 8A |
| for Overland Flow, W73-02322 8B | Statement). W73-01991 8A | Maintenance Dredging, Chatham (Stage) Har- |
| ENTEROVIRUSES | Repair and Protect Our Natural Environment, | bor, Massachusetts (Draft Environmental Im- pact Statement). |
| E. Coli as an Indicator Organism for Disinfec- | W73-01993 6E | W73-02262 4A |
| tion of Water with Respect to Enteroviruses Under Various Conditions, | Tehama-Colusa, Central Valley Project, | Sunrise Subwatershed, Little Sioux Flood |
| W73-02085 5F | California (Final Environmental Impact State- ment). | Prevention Project, Iowa (Draft Environmental Impact Statement). |
| ENTRANCE VELOCITY | W73-01994 8A | W73-02263 4D |
| Relation of Screen Design to the Design of | Hempstead Harbor, New York Navigation Pro- | Small Boat Harbor Project, Bethel, Alaska |
| Mechanically Efficient Wells, W73-02410 | ject (Draft Environmental Impact Statement). W73-01995 | (Final Environmental Impact Statement). W73-02264 4A |

| Pueblo Dam and Reservoir, Fryingpan-Arkan- sas Project Colorado (Final Environmental Im- pact Statement). W73-02265 8D | Hamlin Beach State Park Cooperative Beach Erosion Control Project, Lake Ontario, Mon- roe County, New York (Draft Environmental Impact Statement). | Bucks Harbor, Machiasport, Maine (Final Environmental Impact Statement). W73-02234 8A |
|--|---|--|
| | W73-02261 8A | Boxelder Creek Watershed Project, Colorado |
| Sacramento River Bank Protection Project, | | and Wyoming (Final Environmental Impact |
| California (Draft Environmental Impact Statement). | ENVIRONMENTAL IMPACT STATEMENTS | Statement). W73-02235 4D |
| W73-02266 8D | Construction of Wastewater Facilities, Austin, Texas (Final Environmental Impact Statement). | CONTRACTOR SECTION SEC |
| Leading Creek Conservancy District (Final En- | W73-01980 5D | Highland Lake Fall Creek Basin, Indiana (Draft Environmental Impact Statement). |
| vironmental Impact Statement). W73-02267 5F | Military Ocean Terminal, Sunny Point, North | W73-02253 8D |
| | Carolina (Draft Environmental Impact State- ment). | Maintenance Dredging, Chatham (Stage) Har- |
| Big Creek and Metro Zoo Flood and Aesthetic Improvement, Cleveland, Ohio (Draft Environ- | W73-01981 4A | bor, Massachusetts (Draft Environmental Impact Statement). |
| mental Impact Statement). W73-02268 4A | Port Hueneme Harbor, Ventura County, | W73-02262 4A |
| A STATE OF THE STA | California (Draft Environmental Impact State- ment). | Sunrise Subwatershed, Little Sioux Flood |
| Camp Ground Lake, Salt River Basin, Kentucky (Draft Environmental Impact Statement). | ment). W73-01984 8A | Prevention Project, Iowa (Draft Environmental Impact Statement). |
| W73-02269 8A | | W73-02263 4D |
| River Rouge Flood Control Project, Wayne | Eagle-Tumbleweed Draw Watershed, New Mexico (Draft Environmental Impact State- | |
| County, Michigan (Final Environmental Impact | ment). | Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). |
| Statement). W73-02270 4A | W73-01985 4D | W73-02264 4A |
| | Alum Creek Lake, Alum Creek, Scioto River | Pueblo Dam and Reservoir, Fryingpan-Arkan- |
| The Framework for Analysis, W73-02300 6G | Basin, Ohio (Draft Environmental Impact | sas Project Colorado (Final Environmental Im- |
| | Statement). W73-01986 8A | pact Statement). |
| Newington Generating Station Unit No. 1, Newington, New Hampshire (Draft Environ- | W/3-01280 | W73-02265 8D |
| mental Impact Statement). | Lytle and Warm Creeks, San Bernardino Coun- ty, California (Final Environmental Impact | Sacramento River Bank Protection Project, California (Draft Environmental Impact State- |
| W73-02514 8C | Statement). | ment). |
| Niangua Hydro Project (Draft Environmental Impact Statement). | W73-01987 8A | W73-02266 8D |
| W73-02515 8C | Ririe Dam and Lake, Willow Creek, Idaho (Draft Environmental Impact Statement). | Leading Creek Conservancy District (Final En- vironmental Impact Statement). |
| Saint Catherine Sound, Maryland (Maintenance | W73-01988 8D | W73-02267 SF |
| Dredging) (Final Environmental Impact State- | Lost Creek Lake Project Pome Diver Orogen | Die Creek and Matra Zon Flood and Austhatia |
| ment). W73-02516 4A | Lost Creek Lake Project, Rogue River, Oregon (Final Environmental Impact Statement). W73-01989 8D | Big Creek and Metro Zoo Flood and Aesthetic Improvement, Cleveland, Ohio (Draft Environ- mental Impact Statement). |
| Miami Harbor, Florida, Navigation (Final En- | W 73-01969 8D | W73-02268 4A |
| vironmental Impact Statement). W73-02517 | Whiteoak Dam and Reservoir, Whiteoak Creek Basin, Ohio (Draft Environmental Impact | Camp Ground Lake, Salt River Basin, Ken- |
| Baltimore Harbor Outer Crossing (Patapsco | Statement). | tucky (Draft Environmental Impact Statement). |
| River Bridge) Baltimore, Maryland (Final En- | W73-01990 8A | W73-02269 8A |
| vironmental Impact Statement). W73-02518 | Local Protection and Floodproofing Project, | River Rouge Flood Control Project, Wayne County, Michigan (Final Environmental Impact |
| | Matewan, West Virginia, Tug Fork of Big Sandy River (Draft Environmental Impact | Statement). |
| Unit Plan for Management of the Hiwassee Unit, Cherokee National Forest, Tennessee | Statement). | W73-02270 4A |
| (Draft Environmental Impact Statement). | W73-01991 8A | Newington Generating Station Unit No. 1, |
| W73-02519 4D | Tehama-Colusa, Central Valley Project, | Newington, New Hampshire (Draft Environ- |
| Newhall, Saugus and Vicinity, Los Angeles | California (Final Environmental Impact State- | mental Impact Statement). W73-02514 8C |
| County, Santa Clara River and Tributaries, California (Draft Environmental Impact State- | ment). W73-01994 8A | |
| ment). | | Niangua Hydro Project (Draft Environmental Impact Statement). |
| W73-02521 8A | Hempstead Harbor, New York Navigation Pro- ject (Draft Environmental Impact Statement). | W73-02515 8C |
| Newhalem Creek Project, Washington (Draft | W73-01995 8A | Saint Catherine Saund Mandand (Maintenance |
| Environmental Impact Statement). W73-02522 8C | (Santa Basa Sanama Causty California | Saint Catherine Sound, Maryland (Maintenance Dredging) (Final Environmental Impact State- |
| 11.10.100 | (Santa Rosa, Sonoma County, California, Sewer Collection and Water Distribution | ment). |
| Curry Creek Reservoir, North Oconee River, | System), (Draft Environmental Impact State- | W73-02516 4A |
| Georgia (Draft Environmental Impact Statement). | ment). W73-01996 3D | Miami Harbor, Florida, Navigation (Final En- |
| W73-02523 8A | | vironmental Impact Statement). W73-02517 |
| Clinchfield Dam and Reservoir, Broad River | Taylors Bayou, Texas, Drainage and Flood Control Project (Final Environmental Impact | Baltimore Harbor Outer Crossing (Patapsco |
| Basin, North Carolina and South Carolina (Draft Environmental Impact Statement). | Statement). | River Bridge) Baltimore, Maryland (Final En- |
| W73-02524 8D | W73-02230 8A | vironmental Impact Statement). |
| NVIRONMENTAL IMPACT STATEMENT | Dredging and Filling, Cowikeee State Park, | W73-02518 8A |
| Pearl River Basin, Edinburg Dam and Lake, | Lakepoint Resort, Walter F. George Lake, | Unit Plan for Management of the Hiwassee |
| Mississippi and Louisiana (Draft Environmental Impact Statement). | Chattahoochee River, Alabama (Draft Environ- mental Statement). | Unit, Cherokee National Forest, Tennessee (Draft Environmental Impact Statement). |
| W73-02254 8D | W73-02233 4A | W73-02519 4D |
| | | |

Maine (Final En-8A Project, Colorado onmental Impact 4D sin, Indiana (Draft ent). ham (Stage) Har-invironmental Im-4A tle Sioux Flood aft Environmental 4D Bethel, Alaska Statement). Fryingpan-Arkan-Invironmental Im-8D rotection Project, ntal Impact State-District (Final En-5F ood and Aesthetic io (Draft Environtiver Basin, Kenmpact Statement). l Project, Wayne ironmental Impact ion Unit No. 1, e (Draft Environ-8C aft Environmental 8C land (Maintenance ntal Impact State-

Newl Coun

Newl

Envis W73-

Curry

Georg

Clinc Basin

(Draft W73-6

ENVIRO Envir

Certai Alterr

W73-0

Retua

W73-0

Urani

W73-0 EPIPHY New (

W73-0

EQUIPM Techn

W73-0 Diving roman

W73-0

W73-0 Metho Potent Russia

W73-0

Erosio

W73-02

Re-eva Stream

W73-02

Investi Batholi

W73-02

EROSIO

Sacram Califor

ment). W73-02

EROSIVE Charac Role o

Species Upland

EROSIO Feedba

EPIDEM The E

ENVIRO Legal

| Newhall, Saugus and Vicinity, Los Angeles | ESTUARIES | Introduction to Study of the Chemical Relation- |
|--|--|--|
| County, Santa Clara River and Tributaries, California (Draft Environmental Impact State- | Description of Alabama Estuarine Areas- Cooperative Gulf of Mexico Estuarine Invento- | ships Between the Sediments on the Bottom and the Water of the Lake of Geneva, |
| ment). W73-02521 8A | ry, W73-02037 2L | W73-02592 5C |
| Newhalem Creek Project, Washington (Draft | An Automated Statem for Determining | Weekly Changes of the Bacterio- and Phytoplankton Standing Stock in Lake Balaton |
| Environmental Impact Statement). | An Automated System for Determining Estuarine Bathymetry, | and in the Highly Eutrophic Lake Belso, |
| W73-02522 8C | W73-02317 7B | W73-02594 5C |
| Curry Creek Reservoir, North Oconee River, Georgia (Draft Environmental Impact State- | Proceedings 1971 Technical Conference on Estuaries of the Pacific Northwest. | Comparative Investigations on the Benthic Fauna at Two Sewage Inflows of Lake Balaton. |
| ment). W73-02523 | W73-02454 5C | W73-02595 5C |
| Clinchfield Dom and Because Broad Bisse | The Potential of Physical Models to Investigate | EVALUATION |
| Clinchfield Dam and Reservoir, Broad River Basin, North Carolina and South Carolina | Estuarine Water Quality Problems, W73-02455 | Pesticides and Freshwater Fauna, |
| (Draft Environmental Impact Statement). | W73-02455 5C | W73-02098 5B |
| W73-02524 8D | Applications of Some Numerical Models to | Technical Evaluation of Phosphate-Free Home |
| ENVIRONMENTAL MANAGEMENT | Pacific Northwest Estuaries, W73-02456 5C | Laundry Detergents, W73-02351 5C |
| Environmental Management for Puget Sound: | W13-02430 | special control of the second |
| Certain Problems of Political Organization and Alternative Approaches, | Mathematical Modeling of Estuarine Benthal | EVAPORATION |
| W73-02251 6E | Systems, W73-02457 5C | Concentration of Brines by Spray Evaporation, W73-02081 5E |
| | W15-02451 | |
| ENVIRONMENTAL PROTECTION AGENCY Legal Protection of the Pacific Northwest | Legal Protection of the Pacific Northwest | EVAPORATION CONTROL The Influence of the New England Wetland on |
| Estuaries, | Estuaries, W73-02459 5C | Water Quantity and Quality, |
| W73-02459 5C | W15-02-035 | W73-02116 2D |
| PIDEMIOLOGY | Historical Changes of Estuarine Topography | EVAPOTRANSPIRATION |
| The Effects on Man of Low Concentrations of | With Question Of Future Management Policies, W73-02464 5C | The Influence of the New England Wetland on |
| Uranium, | | Water Quantity and Quality, W73-02116 2D |
| W73-02429 5C | Effects of Institutional Constraints and | W 75-02116 |
| PIPHYTES | Resources Planning on Growth in and Near Estuaries. | EXCHANGE RESINS |
| New Cases of Aquatic Epiphytes, (In Spanish), | W73-02465 5C | Wastewater Treatment by Ion Exchange, W73-02202 5D |
| W73-02551 2I | | |
| EQUIPMENT | ESTUARINE ENVIRONMENT Chemical Responses by Marine Organisms to | Anion Exchange Equilibria Involving Phosphate, Sulphate and Chloride, |
| Techniques for Sampling Benthic Organisms, | Stress, Stress in Hard Clams from a Polluted | W73-02208 5D |
| W73-02019 7B | Estuary, | EXPLORATION |
| Diving Techniques Used in the Study of Fer- | W73-01975 5C | Special Application of Drill-Stem Test Pressure |
| romanganese Nodule Deposits, W73-02513 2H | Description of Alabama Estuarine Areas- | Data, |
| Management and the same of the | Cooperative Gulf of Mexico Estuarine Invento- | W73-02383 8G |
| EROSION | ry, W73-02037 2L | FACILITIES |
| Feedback Relationships in Geomorphology, W73-02040 2J | | Principles and Problems of Municipal Financ- ing, |
| surely at his part of the part of the | Characteristics of Estuarine Sediments of the | W73-02289 6C |
| Methods of Relief Studies for Evaluation of the | United States, W73-02481 2L | FAILURE (MECHANICS) |
| Potential Danger of Water Erosion of Soils (In Russian), | | Shear Failure of Anistropic Rocks, |
| W73-02128 2J | ESTUARINE SEDIMENTS Characteristics of Estuarine Sediments of the | W73-02374 8E |
| Erosion and Deflation of Soils (In Russian), | United States, | A Fracture Criterion for Brittle Anisotropic |
| W73-02163 2J | W73-02481 2L | Rock, |
| CONTRACTOR OF THE PARTY OF THE | EUTROPHICATION | W73-02397 8E |
| Re-evaluation of the Relationship of Master Streams and Drainage Basins, | Water Quality of Hyrum Lake and Its Relation- | FARM WASTES |
| W73-02488 2J | ship to Algal Blooms, | Effect of Animal Wastes Applied to Soils on |
| Investigation of Slope Failures in the Idaho | W73-02121 5C | Surface and Ground Water Systems, W73-01960 5B |
| Batholith, | Nutrient Removal by Waterhyacinth, | |
| W73-02564 2J | W73-02122 5G | FARM WATER SUPPLIES Water Supply Sources for the Farmstead and |
| EROSION CONTROL | The Impact of Reduced Light Penetration on a | Rural Home. |
| Sacramento River Bank Protection Project, | Eutrophic Farm Pond, | W73-02418 4B |
| California (Draft Environmental Impact State- | W73-02349 5C | FAST NEUTRONS |
| ment). W73-02266 8D | Role of Phosphorus in Eutrophication and Dif- | The Sidewall Epithermal Neutron Porosity |
| MIA Establish at assemble to the sale of the | fuse Source Control, | Log, W73-02396 8G |
| EROSIVE CONTROL | W73-02478 5C | |
| Characteristics of Structure and Antierosive Role of Root Systems of Woody and Shrub | Ways in Which a Resident of the Madison | FATTY ACIDS Chemical Responses by Marine Organisms to |
| Species in Eroded Lands of the Volyn-Podolian | Lakes' Watershed may Help to Improve Water | Stress, Stress in Hard Clams from a Polluted |
| Upland (In Russian), | Quality in the Lakes, | Estuary, |
| W73-02055 2I | W73-02479 5C | W73-01975 5C |

| AULTS (GEOLOGY) | FEEDBACK PROCESSES |
|---|--|
| Drilling and Grouting Experiences in Un- | Feedback Relationships in Geomorphology, |
| derground Construction, | W73-02040 2J |
| W73-02070 8A | |
| | FERMENTATION |
| ECAL STREPTOCOCCI | Modeling and Analysis of Washout in Tower |
| Survival and Leaching of Fecal Streptococci | Fermentation Processes, |
| Under Field Conditions, | W73-02554 5D |
| W73-02143 5B | FERRIC HYDROXIDE |
| | Effect of Lime Neutralized Iron Hydroxide |
| EDERAL BUDGET | Suspensions on Juvenile Brook Trout (Sal- |
| Public Works on Rivers and Harbors (Bill | velinus Fontinalis, Mitchill), |
| S.4018). | W73-02277 5C |
| W73-02257 6E | |
| EDERAL GOVERNMENT | FERTILIZERS |
| Environmental Monitoring and Disposal of | The Effect of Fertilizers on Seed Production of |
| Radioactive Wastes from U.S. Naval Nuclear- | Irrigated Alfalfa. (In Ukrainian), |
| Powered Ships and Their Support Facilities, | W73-01997 3F |
| W73-01982 5B | Effect of Mineral Fertilizers and Irrigation on |
| 10 TO | the Yields of Basic Crops, (In Russian), |
| Recent Federal Policies Affecting Marine | W73-02007 3F |
| Science and Engineering Development, | 117-02001 |
| W73-02466 5C | Effect of Polymer Fertilizers on the Structural- |
| | Mechanical Properties of Soil (In Russian), |
| EDERAL JURISDICTION | W73-02140 2G |
| Dow Chemical Co. V. Dixie Carriers, Inc. | |
| (Private Canal Subject to Regulation Under | Contribution to the Study of Nitrogen Leaching |
| Rivers and Harbors Act). | in a Sandy Soil ('Dior') in Senegal, |
| W73-02533 6E | W73-02161 5G |
| EDERAL PROJECT POLICY | FIELD PROCEDURES |
| Proposed Principles and Standards for Planning | How to Dull a Bit for Fun and Profit, |
| Water and Related Land Resources. | W73-02387 8G |
| W73-02231 6E | |
| W/3-02231 OE | FILTERATION |
| Report to the Water Resources Council by the | Filtration Boasts Tertiary Treatment, Mixed- |
| Special Task Force, Findings and Recommen- | Media Filters, Plus Filter Aids, Turn in a Top |
| dations. | Performance, |
| W73-02232 6E | W73-02229 5D |
| | FILTERS |
| EDERAL WATER POLLUTION ACT | High Rate Filtration in Fairfax County, Vir- |
| Repair and Protect Our Natural Environment, | ginia. |
| W73-01993 6E | W73-02146 5F |
| TOTAL STREET, BOLL STREET, GOLDEN | |
| EDERAL WATER POLLUTION CONTROL | Filtration Boasts Tertiary Treatment, Mixed- |
| CT | Media Filters, Plus Filter Aids, Turn in a Top |
| Conference Report on S.2770, Amending | Performance, |
| Federal Water Pollution Control Act. | W73-02229 5D |
| W73-02256 6E | Kenosha Increases Plant Capacity with Micros- |
| Conference Report on the Federal Water Pollu- | trainers. |
| tion Control Act Amendments of 1972, | W73-02426 5F |
| W73-02530 5G | W 13-02420 |
| 1175 02050 | FILTRATION |
| EDERAL WATER POLLUTION CONTROL | High Rate Filtration in Fairfax County, Vir- |
| CT AMENDMENTS OF 1972 | ginia, |
| Conference Report on S.2770, Amending | W73-02146 5F |
| Federal Water Pollution Control Act. | |
| W73-02256 6E | Practical Experience in the use of Polyelec- |
| | trolytes, |
| Conference Report on the Federal Water Pollu- | W73-02203 5D |
| tion Control Act Amendments of 1972, | A Method for Isolating Suspended Solids from |
| W73-02530 5G | Sewage Effluents for Measurement of Oxygen |
| EDERAL WATER POLLUTION CONTROL | Demand, |
| CT OF 1963 | W73-02207 5D |
| Repair and Protect Our Natural Environment, | |
| W73-01993 | Anion Exchange and Filtration Techniques for |
| | |

W73-02537

W73-02109

Minnesota Pollution Control Agency V. Hatfield (Public Expenditures for Water Pollution Abatement as a Legitimate Public Purpose).

Development Work is Essential.

FINANCING

FINES

| FINITE ELEMENT ANALYSIS | |
|---|---|
| Note on the Finite Element Solution of the Diffusion-Convection Equation. | |
| W73-02338 2I | Š |
| Finite Element Analysis of Flow Toward Arte sian Well, | |
| W73-02340 21 | 9 |
| FIR-G | |
| Comparative Ecologic Investigation on Platea Fir Forest in the Western Aargau Mountain Area (Switzerland), (In German). | |
| W73-02056 4/ | 4 |
| FIRM WATER YIELD | |
| Further Studies of Optimum Operation of Desalting Plants as a Supplemental Source of Firm Yield. | |
| W73-02082 34 | ١ |
| FIRN | |
| Some Observations on Superimposition of Ic | |
| on the Devon Island Ice Cap, N.W.T., Canada, W73-02046 | |
| | |
| FISH | |
| The Contribution of Leptodora and Othe Zooplankton to the Diet of Various Fish, | |
| W73-02031 50 | - |
| FISH BEHAVIOR | |
| Thermal, Turbidity, and pH Conditions of th Upper White River: Sioux and Dawes Counties, Nebraska | |

FISHERY Evaluat Wester W73-02 PLOCCU Applica Problem W73-01 A Stati trolytes Sludge W73-02 FLOOD C Alum (Basin, Statem W73-01 The Fo W73-02 Taylors Control W73-02 Boxelde and W W73-02

Sacram

ment).

W73-02

Big Cre

Improv mental W73-02

Camp tucky (

W73-02 River

County

Stateme W73-02

Waters

ple Soc W73-02

FLOOD I

FLOOD I

Arizona W73-02

Northw

W73-02

FLOOD I

The Fo

souri R W73-02

Manage W73-02

FLOOD F

Northw

W73-02

Arizona W73-02

Informal, Turoidinty, and pri Conditions of the Upper White River: Sioux and Dawes Counties, Nebraska,
W73-02151 5C
Induced Aggregation of Pond-Reared Rainbow Trout (Salmo gairdneri) Through Acoustic Conditioning,
W73-02576 8I
Note on the Swimming Behavior of Chironomus Plumosus Larvae in Lake Suwa,
(In Japanese),
W73-02586 2H

FISH BEHAVIRO
A Simple Apparatus for Measuring Activity
Patterns of Fishes,
W73-01977
5A
FISH CONSERVATION
Effects of Handling and Salinity on Oxygen

Effects of Handling and Salinity on Oxygen Requirements of the Striped Bass, Morone Saxatilis, W73-02435 5C

FISH FOOD ORGANISMS

The Contribution of Leptodora and Other
Zooplankton to the Diet of Various Fish,
W73-02031

5C

FISH KILL

Effects of Handling and Salinity on Oxygen
Requirements of the Striped Bass, Morone
Saxatilis,

W73-02435

5C

FISH PHYSIOLOGY
Morphological Characteristic of Aspro Zingel
(L.) From the Lower Danube, (In Russian),
W73-01998
2I
Temperature Tolerance and Thyroid Activity of
the White Perch Roccus (±Morone) Americanus,
W73-02273
5C

FISH POPULATIONS
Fish Populations Around Edgewood Arsenal's
Chemical Agent Test Area,
W73-02021
5C

W73-02121

ACT

FEDERAL WATER PROJECT RECREATION

The Problems and Issues of Implementing Na-

tional Water Legislation at Subnational Levels,

Water Quality of Hyrum Lake and Its Relationship to Algal Blooms,

| VISHERY MANAGEMENT | FLOOD PROTECTION | FLOW AROUND OBJECTS |
|--|---|--|
| Evaluation of a Winter Steelhead Fishery on a | Lytle and Warm Creeks, San Bernardino Coun- | Effect of Well Screens on Flow Into Wells, |
| Western Washington River, | ty, California (Final Environmental Impact | W73-02389 8B |
| W73-02575 8I | Statement). W73-01987 8A | Density Stratified, Viscous Flow Past a Flat |
| FLOCCULATION | W/3-0130/ | Plate, |
| Applications of Agglomerate Testing to | Local Protection and Floodproofing Project, | W73-02563 8B |
| Problems in Water Resources Management, | Matewan, West Virginia, Tug Fork of Big | |
| W73-01965 5F | Sandy River (Draft Environmental Impact | FLOW CHARACTERISTICS |
| A Statistical Study of The Effects of Delucies | Statement). | Serial-Correlation Structure of Discretized |
| A Statistical Study of The Effects of Polyelec- trolytes, Mixing and pH Upon an Activated | W73-01991 8A | Streamflow, |
| Sludge System, | Pueblo Dam and Reservoir, Fryingpan-Arkan- | W73-02323 2E |
| W73-02221 5D | sas Project Colorado (Final Environmental Im- | THE OWNER OF THE OWNER O |
| | pact Statement). | FLOW CHEMICAL REACTORS |
| PLOOD CONTROL | W73-02265 8D | Efficiency and Utility of Collocation Methods |
| Alum Creek Lake, Alum Creek, Scioto River | | in Solving the Performance Equations of Flow Chemical Reactors with Axial Dispersion, |
| Basin, Ohio (Draft Environmental Impact | Annual Compilation and Analysis of Hydrolog- | W73-02552 5D |
| Statement). W73-01986 8A | ic Data for Little Elm Creek, Trinity River | W 15-02552 |
| W73-01986 8A | Basin, Texas, 1970, W73-02324 7C | FLOW MEASUREMENT |
| The Forest Overstory Vegetation on the Mis- | W 73-02324 | Effect of Well Screens on Flow Into Wells, |
| souri River Floodplain in North Dakota, | FLOODPLAINS | W73-02389 8B |
| W73-02185 4A | Distribution of the Water Chestnut Trapa | |
| m - 1 - 2 | natans L. s. l. in the Floodplains of Bodies of | FLOW RESISTANCE |
| Taylors Bayou, Texas, Drainage and Flood | Water in the Vladimir Oblast and Their | Tentative Data on Flow Resistance in Suspen- |
| Control Project (Final Environmental Impact Statement). | Hydrochemical Characterization, (In Russian), | sion Currents, |
| W73-02230 8A | W73-02000 2I | W73-02156 2J |
| W13-02230 | The Effect of Soil and Hydrological Conditions | FLOW THEORY |
| Boxelder Creek Watershed Project, Colorado | on the Settlement and Productivity of Tree and | Effect of Well Screens on Flow Into Wells, |
| and Wyoming (Final Environmental Impact | Shrub Vegetation of Don River Floodplain, (In | W73-02389 8B |
| Statement). | Russian), | W 13-02303 |
| W73-02235 4D | W73-02199 4A | FLUCTUATIONS |
| Sacramento River Bank Protection Project, | 111 | Annual Streamflow Fluctuations in the Dni- |
| California (Draft Environmental Impact State- | FLOODS | ester River Basin (Kolebaniya godovogo stoka |
| ment). | Meteorological and Hydrological Analysis of | rek basseyna Dnestra), |
| W73-02266 8D | the August 27-28, 1971, New Jersey Flood, | W73-02335 4A |
| | W73-02174 2A | |
| Big Creek and Metro Zoo Flood and Aesthetic | Arizona Floods of September 5 and 6, 1970. | FLUID ASCENSION |
| Improvement, Cleveland, Ohio (Draft Environ- | W73-02325 2E | Filtrate Invasion in Highly Permeable Sands, |
| mental Impact Statement). | W15-02525 | W73-02422 8B |
| W73-02268 4A | Floods in the Aguadilla-Aguada Area, | FLUID FRICTION |
| Camp Ground Lake, Salt River Basin, Ken- | Northwestern Puerto Rico, | Effect of Friction on Wave Shoaling, |
| tucky (Draft Environmental Impact Statement). | W73-02327 7C | W73-02173 2E |
| W73-02269 8A | Storm Burnett Coefficients for Bisser of the | W/3-021/3 |
| | Storm Runoff Coefficients for Rivers of the Ukraine and Moldavia (Koeffitsiyenty stoka | FLUORIDATION |
| River Rouge Flood Control Project, Wayne | dozhdevykh pavodkov na rekakh Ukrainy i | Alternatives for Fluoridation of Aqueducts (In |
| County, Michigan (Final Environmental Impact | Moldavii), | Italian), |
| Statement). W73-02270 4A | W73-02333 4A | W73-02160 5G |
| W 13-02210 4A | | |
| Watershed Project Evaluation Involving Multi- | A Summary of Peak Stages and Discharges in | FLUTED MORAINES |
| ple Social Objectives, | New York for the Flood of June 1972, | The Origin of Fluted Moraine at the Fronts of |
| W73-02348 6B | W73-02492 2E | Contemporary Glaciers, |
| | FLORIDA | W73-02045 2J |
| FLOOD DAMAGE | A Water Quality Model for a Conjunctive Sur- | FOOD CHAINS |
| Arizona Floods of September 5 and 6, 1970. | face-Groundwater System: An Overview, | The Contribution of Leptodora and Other |
| W73-02325 2E | W73-02178 5B | Zooplankton to the Diet of Various Fish, |
| FLOOD DATA | | W73-02031 5C |
| Arizona Floods of September 5 and 6, 1970. | What's So Great About MgCO3, | |
| W73-02325 2E | W73-02219 5F | FOOD HABITS |
| | Radman Danudawa Cauca Traca | The Contribution of Leptodorn and Other |
| Floods in the Aguadilla-Aguada Area, | Rodman Drawdown Saves Trees, W73-02258 6E | Zooplankton to the Diet of Various Fish, |
| Northwestern Puerto Rico, W73-02327 7C | W/3-02236 | W73-02031 5C |
| W 13-02321 /C | Miami Harbor, Florida, Navigation (Final En- | DOBEG LOTTING |
| FLOOD PLAINS | vironmental Impact Statement). | FORECASTING |
| The Forest Overstory Vegetation on the Mis- | W73-02517 8A | Alternative Demands for Water and Land for |
| souri River Floodplain in North Dakota, | | Agricultural Purposes, W73-02363 6D |
| W73-02185 4A | FLOTATION | H 13-02303 6D |
| Manager Problems in File of Phylip Assess | Treatment Plant at Virginia Mill. W73-02210 5D | Hydrologic Modeling, |
| Management Problems in Flood Plain Areas, | W73-02210 5D | W73-02547 2A |
| W73-02288 6F | FLOW | |
| FLOOD PROFILES | Hydrologic Investigations and Flow Computa- | FOREST ECOSYSTEMS |
| Floods in the Aguadilla-Aguada Area, | tions (Gidrologicheskiye issledovaniya i | An Experiment in Modeling Rocky Mountain |
| Northwestern Puerto Rico, | raschety stoka). | Forest Ecosystems, |
| 11/22 20207 | W72 0220 AA | W/441/366 2A |

GEOLOGI A Regio Green B W73-025

GEOLOGY Geology W73-020 Geophy cal Rec Central W73-024

Seismic Waterfr W73-025 Lake E Mohawi W73-02 GEOMOR A Progr Watersh Geomos tributing W73-01

> The Eve W73-02 Feedba W73-02

Hydron Effects W73-02

The Or Contem W73-02 The Ef Flow o (County W73-02

Re-eva Stream W73-02 GEOPHY Well L W73-02 GEORGI A Stud on Lak W73-01

Curry

Georgi ment). W73-02 GEORGI Studie Migrat Crysta W73-0

GEOTHI Direct Associ the Ba W73-0

Interpretation of Wells, W73-0

8B

Compositional Logging of Air-Drilled Wells, W73-02377

| FOREST MANAGEMENT | FREQUENCY ANALYSIS | Reuse of Surface Runoff from Furrow Irriga- |
|--|--|--|
| Unit Plan for Management of the Hiwassee | Flow Routing Models for Stream System Stu- | tion, W73-02118 |
| Unit, Cherokee National Forest, Tennessee (Draft Environmental Impact Statement). | dies, W73-02176 2E | W/3-02116 |
| W73-02519 4D | W/3-021/0 | FUTURE PLANNING (PROJECTED) |
| | FRESHWATER | Report to the Water Resources Council by the |
| POREST WATERSHEDS | Protection of Water Sources in the Lower | Special Task Force, Findings and Recommen- |
| An Analysis of Forested Watershed Land of | Dnieper River Basin (Okhrana vodnykh | dations. |
| the Cape Fear River Basin Using a Computer- | istochnikov v basseyne Nizhnego Dnepra), | W73-02232 6E |
| Oriented Alphanumeric Map Information As- sembly and Display System, | W73-02329 4A | The Problems and Issues of Implementing Na- |
| W73-02358 7C | Control of Aquatic Vegetation in Freshwater, | tional Water Legislation at Subnational Levels, |
| 117-02550 | W73-02444 4A | W73-02242 6E |
| FORESTRY | | |
| The Forest Overstory Vegetation on the Mis- | FRESHWATER FISH | Water Resource Planning. |
| souri River Floodplain in North Dakota, | Fisheries, Cooling-Water Discharges and | W73-02368 6B |
| W73-02185 4A | Sewage and Industrial Wastes, W73-02433 SC | CACING OF A STORIES |
| PORESTS | W 73-02A33 | GAGING STATIONS History of Water Level Gauges, LAKE Erie |
| Comparative Ecologic Investigation on Plateau | FRICTION | and The Niagara River. |
| Fir Forest in the Western Aargau Mountain | Relation of Screen Design to the Design of | W73-02493 7C |
| Area (Switzerland), (In German), | Mechanically Efficient Wells, | 113-02433 |
| W73-02056 4A | W73-02410 8B | GALLATIN RIVER (MONT) |
| PORMULATION | MAGO. | A Source Study of the Suspended Solids in the |
| Technical Evaluation of Phosphate-Free Home | FROGS | Gallatin River, |
| Laundry Detergents, | Under-Ice Observations of Wintering Sites of Leopard Frogs, | W73-02559 5B |
| W73-02351 5C | W73-02583 2C | A |
| | 1175-02505 | GALVANIC CELLS |
| ORT WORTH (TEX) | FROST ACTION | Microbiological Corrosion of Iron and Steel, |
| Annual Compilation and Analysis of Hydrolog- | Frost Cracking in the Colorado Front Range, | W73-02403 8G |
| ic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, | W73-02043 2C | GAMMA RAYS |
| W73-02482 7C | Minamia Baulder Elaw and No Communic | Effects of Acute Gamma Radiation and Tem- |
| 117-02-102 | Wisconsin Boulder Flow and Its Geomorphic Implications, Franklin Mountains, El Paso | perature on Growth and Survival of Juvenile |
| FORTY MILE CREEK (CANADA) | County, Texas, | Rainbow Trout (Salmo Gairdneri), |
| Hydrogeology of the Forty Mile Creek | W73-02487 2J | W73-02102 5C |
| Drainage Basin on the South Shore of Lake | 1175-02107 | |
| Ontario, | FROST CRACKS | GAS CHROMATOGRAPHY |
| W73-02503 2H | Frost Cracking in the Colorado Front Range, | Methods for Organic Pesticides in Water and |
| OUNDATIONS | W73-02043 2C | Wastewater. W73-02436 5A |
| Rate of Settlement Under Two- and Three- | FROST HARDINESS | W73-02436 5A |
| Dimensional Conditions, | Frosthardiness of Apple Trees Scored Accord- | GAS-INSULATED CABLES |
| W73-02075 8D | ing to the Water Retention Ability of Leaves | Researchers Seek Ways to Lower Costs of Un- |
| RACTURE CRITERIA | (In Czechoslovakian), | derground Transmission Systems, |
| Shear Failure of Anistropic Rocks, | W73-02164 2D | W73-02074 8C |
| W73-02374 8E | | A RESIDENCE OF THE RESIDENCE OF THE PERSON O |
| | FROST HEAVING | GASPE COD |
| FRANCE | Frost Cracking in the Colorado Front Range, W73-02043 2C | The Gaspe Cod Ecosystem in the Gulf of St. |
| The Content of Various Elements in Precipita- | W/3-02043 | Lawrence: II, Weekly Fluctuations of Com- mercial Trawl Catches of Cod With Depth and |
| tion, | Frost-Heaving Pressures, | Temperature in 1960-1962, |
| W73-02588 2K | W73-02371 2C | W73-02581 2L |
| FRANKLIN MOUNTAINS (TEX) | - CO and below the best and the | 11 13-02501 |
| Wisconsin Boulder Flow and Its Geomorphic | FRYINGPAN-ARKANSAS PROJECT | GELS |
| Implications, Franklin Mountains, El Paso | Pueblo Dam and Reservoir, Fryingpan-Arkan- | Development Work is Essential. |
| County, Texas, | sas Project Colorado (Final Environmental Im- pact Statement). | W73-02110 8B |
| W73-02487 2J | W73-02265 8D | CONTROL OF THE PARTY OF THE PAR |
| FREEZE-THAW TESTS | 1173 02203 | GENETICS |
| Frost-Heaving Pressures, | FUGOR | Biological Effects of Trinitrotoluene (TNT), W73-02101 5C |
| W73-02371 2C | Influence of Mist Irrigation on Growth, Yields, | W/3-02101 SC |
| | and Quality of Potatoes and Snap Beans, | GEOCHEMISTRY |
| FREEZING | W73-01966 3F | Geochemistry of Ground Waters from Burg El- |
| Computing Salinity Profiles in Ice, | FUNDULUS SPECIES | Arab Area, Egypt, |
| W73-02054 2C | Elemental Composition of the Estuarine | W73-02053 2K |
| Water-Retaining Forces of the Cells of Winter | Teleost Fundulus Heteroclitus (L.), | EST NOOTH OF THE PERSON AND THE PERS |
| Wheat Leaves and Tillering Nodes with Regard | W73-02278 5C | Geophysical, Geohydrological, and Geochemi- |
| to Their Resistance to Slow Freezing and | | cal Reconnaissance of the Luke Salt Body, |
| Desiccation (In Russian), | FUNGI | Central Arizona, W73-02480 2F |
| W73-02123 3F | Environments and the Distribution of | 11 /3-02-100 ZF |
| Relation of Ice Freezeup Dates and Ice-Cover | Microfungi in a Hawaiian Mangrove Swamp, W73-02189 2I | GEOLOGIC HISTORY |
| Duration to Elevation and Channel Slopes of | W /3-02109 21 | New Evidence for Spencer's Laurentian River, |
| Carpathian Rivers (O svyazi srokov | FURROW IRRIGATION | W73-02505 2H |
| ustanovleniya i prodoizhitel'nosti ledostava s | A Study of the Effects of Mist Irrigation on the | |
| vysotoy mestnosti i uklonami na rekakh Kar- | Potato (Solanum tuberosum L.) and the Snap | GEOLOGIC INVESTIGATIONS |

Potato (Solanum tuberosum L.) and the Snap Bean (Phaseolus vulgaris L.), W73-01967 3F

pat), W73-02337

| A Regional Geophysical Investigation of | the Investigations on the Lo | ading of the Untertrave | Effects of Temperature on Osmotic and Ionic |
|---|--|--|--|
| Green Bay Area, | with Sewage, (In Germa | | Regulation in Goldfish, |
| W73-02502 | 2H W73-02016 | 5C | W73-02103 SC |
| GEOLOGY | Biomass and Production | on of Macrobenthos in | Feeding, Dietary Interrelationships of Fish and |
| Geology and Dams. Volume IV. | the Deeper parts of Kiel | | the Effectiveness of Their Use of Food |
| W73-02067 | 8A W73-02094 | 2L | Resources in Natural Bodies of Water in the |
| Geophysical, Geohydrological, and Geoche | emi- GERMINATION (SEEDS) | 1147 101 | Byelorussian Polesya. II. Diet of Goldfish in |
| cal Reconnaissance of the Luke Salt Be | | | Lakes, W73-02590 2H |
| Central Arizona, | Influence of Soaking as | nd Redrying on the Ger- | |
| W73-02480 | | lum Coccineum Seeds | GOVERNMENT FINANCE |
| Seismic Profiling and Geology of the Toro | onto the Effect, | bution of an Inhibitor to | Conference Report on S.2770, Amending Federal Water Pollution Control Act. |
| Waterfront Area of Lake Ontario, | W73-02093 | 21 | W73-02256 6E |
| W73-02501 | 2H | | |
| Lake Erie Nearshore Sediments-Fort Eri | GLACIAL DRIFT | foraine at the Fronts of | Public Works on Rivers and Harbors (Bill S.4018). |
| Mohawk Point, Ontario, | Contemporary Glaciers. | | W73-02257 6E |
| W73-02504 | 2H W73-02045 | 21 | The second secon |
| GEOMORPHOLOGY | Same Sadimentalesias | Aspects of the Flu- | GRADIENTS (STREAMS) Relation of Ice Freezeup Dates and Ice-Cover |
| A Program for Estimating Runoff from Ind | | lain Near Soesterberg | Duration to Elevation and Channel Slopes of |
| Watersheds, Part III Analysis | of (The Netherlands). | | Carpathian Rivers (O svyazi srokov |
| Geomorphologic Data and a Dynamic | | 21 | ustanovleniya i prodoizhitel'nosti ledostava s |
| tributing Area Model for Runoff Estimation W73-01952 | 2A Glacial-Drift Gas in Illin | nois | vysotoy mestnosti i uklonami na rekakh Kar- |
| | W73-02391 | 8D | pat), W73-02337 4A |
| The Evolution of Coastal Sand Dunes, | | COLUMN TO LANGE | |
| W73-02035 | 2J GLACIATION | Superimposition of Ice | GRAIN SIZES |
| Feedback Relationships in Geomorphology, | on the Devon Island Ice | | Evaluation of Properties of Rockfill Materials, |
| W73-02040 | 2J W73-02046 | 2C | W73-02072 8D |
| Hydrometeorological Relationships and T | Dain | ATT DESIGNATION | GRAPHICAL ANALYSIS |
| Effects on the Levees of a Small Arctic De | GENCLEMO | Conscionacition of Ico | A Nomograph Based on Kinematic Wave |
| W73-02041 | - Donie Good, Indone on | Superimposition of Ice Cap, N.W.T., Canada, | Theory for Determining Time of Concentration |
| | W73_02046 | 2C | for Overland Flow, W73-02322 8B |
| The Origin of Fluted Moraine at the Front Contemporary Glaciers, | | | W 13-02322 |
| W73-02045 | 2J Delay of Runoff from a W73-02048 | Glacier Basin, | How to Dull a Bit for Fun and Profit, |
| de la companya de la | 173-020-10 | 20 | W73-02387 8G |
| The Effects of Selective Erosion by Over | . Cucumuon and riyeror | ogy Under the Seasonal | GRAVEL PACKING |
| Flow on the Ice-Pushed Ridges of Uc (County Bentheim, Germany), | Tee in michigan de beame | | Judging Proper Gravel-Pack Thickness. |
| W73-02157 | 2J W73-02051 | 2C | W73-02108 8B |
| Described and the Debut and the CAM | | y (Inzhenernaya glyat- | The Technical Aspects of Gravel Well Con- |
| Re-evaluation of the Relationship of Ma Streams and Drainage Basins, | siologiju). | *** | struction, |
| W73-02488 | W73-02060 | 2C | W73-02393 8A |
| | On the Use of Stable | Isotopes to Trace the | Hydraulic Properties of Perforated Well Cas- |
| GEOPHYSICAL STUDIES | Origins of Ice in a Float | | ings, |
| Well Logs in Carbonate Reservoirs, W73-02424 | 4R W73-02168 | 2C | W73-02395 8B |
| | GLACIOHYDROLOGY | | Place Gravel Pack Properly for Best Results. |
| GEORGIA | Delay of Runoff from a | | W73-02416 8B |
| A Study of the Effects of Island Develope | ment W73-02048 | 2C | |
| on Lake Water Quality, W73-01954 | 5C GLACIOLOGY | | GRAVELS Judging Proper Gravel-Pack Thickness. |
| | Engineering Glaciolog | y (Inzhenernaya glyat- | W73-02108 8B |
| Curry Creek Reservoir, North Oconee R | iver, siologiya). | | |
| Georgia (Draft Environmental Impact S ment). | tate- W73-02060 | 2C | Some Sedimentological Aspects of the Flu- |
| W73-02523 | 8A Research Projects in Gl | laciology, 1972. | vioglacial Outwash Plain Near Soesterberg (The Netherlands), |
| | W73-02314 | 2C | W73-02159 2J |
| GEORGIA PIEDMONT Studies of Saprolite and Its Relation to | the Remarked Delunement | ohs from the West Ice | |
| Migration and Occurrence of Groundwate | | ctica, and Their Possible | The Technical Aspects of Gravel Well Con- struction. |
| Crystalline Rocks, | Geological and Pal | aeoclimatological Sig- | W73-02393 8A |
| W73-01955 | 2F nificance, | | |
| GEOTHERMAL STUDIES | W73-02495 | 2J | Hydraulic Properties of Perforated Well Cas- ings, |
| Direct Observations of Columnar Scatte | ering GOCZALKOWICE (USSI | R) | W73-02395 8B |
| Associated with Geothermal Gas Bubblin | g in Overgrowing of the Da | m Reservoir at Goczal- | |
| the Bay of Plenty, New Zealand, | kowice in the Years 196 | 57-1969, 2H | Place Gravel Pack Properly for Best Results. W73-02416 |
| W73-02052 | 2L W73-02088 | 2H | W 13-02410 8B |
| Interpretation of Temperature Logs in Wa | ater- GOITER | | GRAVITY DAMS |
| and Gas-Injection Wells and Gas-Produ | | Urochrome in Endemic | A Theoretical Study of the Pressures Acting on a Rigid Wall by a Sloping Earth or Rock Fill, |
| Wells, W73-02405 | Goiter, 8G W73-02425 | 5F | W73-02077 8D |
| | | | |

| Uplift Computations for Masonry Dams, W73-02080 | BA Bibliograficheskiy ukazatel'. 1918-1965), | Ground-Water Conditions in Anderson, |
|---|--|---|
| W 73-02000 | | F Cherokee, Freestone, and Henderson Counties, |
| GREAT LAKES | | Texas. |
| Design, Execution, and Results of a Mesosci Snowstorm Modification Project, | Landfills. Vol 2, | |
| W73-02483 | 2C W73-02106 | B A Shallow Artesian Aquifer in the Tertiary |
| Proceedings, Fourteenth Conference on Gre | | d- Deposits of Southern Cape York Peninsula, W73-02309 4B |
| Lakes Research. W73-02498 | fills. Vol 3, 2H W73-02107 | B GROUP DATA HANDLING |
| New Evidence for Spencer's Laurentian Rive W73-02505 | tr chemical ramy see or maner room ocher man | |
| A Water Use Map of the Great Lakes Basin, | Wells in the Edwards and Associate Limestones, San Antonio Area, Texas, 1967. | od W73-02032 5B |
| W73-02512 | | K GROUTING |
| GREAT LAKES BASIN | Water Economics, | Drilling and Grouting Experiences in Un- derground Construction, |
| A Water Use Map of the Great Lakes Basin, | | B W73-02070 8A |
| W73-02512 | GROUNDWATER AVAILABILITY | . Seismic Borehole Plug. |
| GREAT LAKES REGION | Water Supply Sources for the Farmstead as | d W73-02384 8C |
| Great Lakes Basin Commission Challenges i | | |
| the Future. An Interim Report on the Gre Lakes Basin Framework Study. | cal W/3-02418 | Well Grouting and Well Protection, |
| | 6B GROUNDWATER CONTAMINATION | W73-02408 8F |
| CORP. III ANT. LOT BETTER COMMON | Water wells and Ground Water Contamination | GROWIN (Fran) |
| GREAT MIAMI RIVER (OHIO) Determination of Trace Metal Pollutants | | B Interactions of Feeding Rates and Environmen- |
| Water Resources and Sediments, | GROUNDWATER ECONOMICS | tal Temperature on Growth, Food Conversion, |
| W73-01958 | 5A A Re-Examination of the Common Po | ol and Body Composition of Channel Catfish, W73-02572 8I |
| GREAT SALT MEADOW (CONN) | Problem, W73-01956 | B CROWTH (FISH) |
| Pave the Wetlands or Let Them Be, | The second of th | GROWTH (FISH) Growth Responses of Young Sockeye Salmon |
| W73-02252 | 6E GROUNDWATER EXPLORATION | (Oncorhynchus nerks) to Different Diets and |
| GREEN BAY AREA (WISC) | The Electric Log: Geophysics' Contribution Ground Water Prospecting and Evaluation, | Planes of Nutrition, |
| A Regional Geophysical Investigation of t | | B W73-02571 8I |
| Green Bay Area, W73-02502 | 2H CROUNDWATER MOVEMENT | Age, Growth, and Downstream Migration of |
| | GROUNDWATER MOVEMENT Finite Element Analysis of Flow Toward Art | Juvenile Rainbow Trout (Salmo gairdneri) in a |
| GREEN MANURE | sian Well. | Lake Michigan Hibutary, |
| Algal Nitrogen Fixation in the Tropics, W73-02473 | | W73-02574 8I |
| | | GROWTH RATES |
| GREENLAND | Water Well Hydraulics, W73-02370 | Fish Populations Around Edgewood Arsenal's |
| Meltwater Gaging Program Project No 1, A proach Roads, Tuto Area, Greenland. | | Chemical Agent Test Area, |
| | 2C Initiation of Ground-Water Flow in Joint | ed W73-02021 . SC |
| GROUND WATER | Limestone, W73-02375 | Studies on Algal Growth, Development, and |
| Salt Pollution of Ground Water, | #15-02515 | Reproduction, |
| | 5B Hydrogeology of the Forty Mile Cre | |
| GROUND WATER AVAILABILITY | Drainage Basin on the South Shore of La | GROWTH STAGES |
| The Electric Log: Geophysics' Contribution | Ontario, to W73-02503 | H Studies on Algal Growth, Development, and |
| Ground Water Prospecting and Evaluation, | W 15-02505 | Reproduction, |
| | 4B GROUNDWATER RECHARGE | W73-02099 5C |
| GROUND WATER LEVEL | Recharge to Ground Water from the We | GROWTH (TREES) |
| Biological Characteristics of Cranberries a | Nishnabotna River, wr3-02033 | Ponderosa Pine Planting Techniques, Survival |
| the Problem of Their Cultivation. 1. Effect | of | and Height Growth in the Idaho Batholith, |
| Ground Water Level, Sand Layer Thickney | | |
| and Type of Peat on Rootage of Cuttings a Shoot Growth, (In Lithuanian), | | |
| | 3F Associated Limestones, San Antonio Are Texas,-1968. | Observations of Declining Water Lettuce Popu- |
| | | F lations in Lake Izabal, Guatemala, |
| GROUND-WATER MOVEMENT Hydraulics of Wells, | | W73-02549 2H |
| | 8B Groundwater Recharge and Quality Transfe | |
| | mations During Initiation of a New Sewage Sibilization Pond (and Management), | The Gaspe Cod Ecosystem in the Gulf of St. |
| GROUNDWATER Effect of Animal Wastes Applied to Soils | 3272 03430 | B Lawrence: II, Weekly Fluctuations of Com- |
| Surface and Ground Water Systems, | Oil | mercial Trawl Catches of Cod With Depth and |
| | 5B Groundwater Recharge and Quality Transfer | |
| Genehamistan of Ground Waters from Pour | mations During Initiation and Management of New Stabilization Lagoon, | |
| Geochemistry of Ground Waters from Burg ! Arab Area, Egypt, | | B GULF COASTAL PLAIN |
| | 2K | Taylors Bayou, Texas, Drainage and Flood |
| Bibliography on the Hydrogeology of Sibe | Hydrochemical Study of the National React ria Testing Station, Idaho, | or Control Project (Final Environmental Impact Statement). |
| and the Soviet Far East for the Period 19 | | 5B W73-02230 8A |
| | | |

The Princip Psammon and Freshy W73-02599

GULF OF M Description Cooperative ry, W73-02037

Sunrise S Prevention Impact Sta W73-02263

PROJECT
Hamlin Be
Erosion C
roe Count
Impact Str
W73-02261
HARBORS
Port Hue
California

California ment). W73-01984 Hempstea ject (Draft W73-01995

> Bucks Ha vironment W73-0223 Maintenan bor, Mass pact State W73-0226

pact State W73-0226 Small Bo (Final En W73-0226

A Study of as Related W73-0246

Studies of Migration Crystallin W73-0195

HARDWOO Solar Rad wood For W73-0256

HARRIS Co Chemical Harris Co W73-020

Influence and Qual W73-019

The Influ II. Grow W73-024

| GULF OF FINLAND | HAW RIVER (NC) | HEMPSTEAD HARBOR (N.Y.) |
|---|--|--|
| The Principle of Dispersal of the Subterranean | A Survey of the Benthic Macroinvertebrate | Hempstead Harbor, New York Navigation Pro- |
| Psammon at the Transition Between Seawater | Populations in the New Hope and Lower Haw Rivers. | ject (Draft Environmental Impact Statement). W73-01995 |
| and Freshwater, W73-02599 2L | W73-02355 5B | |
| W15-0259 | AND RESIDENCE AND ADDRESS OF THE PARTY OF TH | HEPATITIS |
| GULF OF MEXICO REVIEW | Heavy Metal Analyses of Freshwater Macroin- | Effect of Donetsk Mineral Water on the Clini- |
| Description of Alabama Estuarine Areas- | vertebrates from the Lower Haw and New Hope Rivers, | cal Course of Chronic Cholangiohepatitis, (In Russian). |
| Cooperative Gulf of Mexico Estuarine Invento- | W73-02356 5A | W73-02002 5C |
| ry, W73-02037 2L | | |
| W 73-02037 2L | HAWAII | HIGH-RATE FILTRATION |
| GULLY EROSION | Hawaii Regional Inventory of the National Shoreline Study. | High Rate Filtration in Fairfax County, Vir- ginia, |
| Sunrise Subwatershed, Little Sioux Flood | W73-02321 8B | W73-02146 5F |
| Prevention Project, Iowa (Draft Environmental | Charles of Charles of Lances Lances | |
| Impact Statement). | Collected Reprints, Volume II 1969-1970. | HIGH-RATE SETTLERS |
| W73-02263 4D | W73-02347 4B | High Rate Filtration in Fairfax County, Vir- ginia, |
| HAMLIN BEACH EROSION CONTROL | HAWAII (OAHU) | W73-02146 5F |
| PROJECT | Environments and the Distribution of | |
| Hamlin Beach State Park Cooperative Beach | Microfungi in a Hawaiian Mangrove Swamp, | HIGH-SPEED PHOTOGRAPHY |
| Erosion Control Project, Lake Ontario, Mon- | W73-02189 2I | Some Results of Dri Investigations-Rock Failure in Percussion, |
| roe County, New York (Draft Environmental | HEAT BALANCE | W73-02406 8E |
| Impact Statement). | Study of the Thermal Regime of Rivers (Ob | |
| W73-02261 8A | izuchenii termicheskogo rezhima rek), | HIGHLAND LAKE FALL CREEK BASIN (IND) |
| HARBORS | W73-02336 4A | Highland Lake Fall Creek Basin, Indiana (Draft Environmental Impact Statement). |
| Port Hueneme Harbor, Ventura County, | HEAT BUDGET | W73-02253 8D |
| California (Draft Environmental Impact State- | Study of the Thermal Regime of Rivers (Ob | 117-02255 |
| ment). | izuchenii termicheskogo rezhima rek). | HILLS CREEK RESERVOIR (ORE.) |
| W73-01984 8A | W73-02336 4A | Hills Creek Reservoir Turbidity Study, |
| Hempstead Harbor, New York Navigation Pro- | | W73-02092 5C |
| ject (Draft Environmental Impact Statement). | HEAT RESISTANCE Temperature Tolerance and Thyroid Activity of | HISTORIC FLOODS |
| W73-01995 8A | the White Perch Roccus (±Morone) Amer- | Arizona Floods of September 5 and 6, 1970. |
| | icanus, | W73-02325 2E |
| Bucks Harbor, Machiasport, Maine (Final En- | W73-02273 5C | HISTORY |
| vironmental Impact Statement). | **** | Notes on the Early History of Water-Well |
| W73-02234 8A | HEAT TRANSFER Thermal Effects of Power Plants on Lakes, | Drilling in the United States, |
| Maintenance Dredging, Chatham (Stage) Har- | W73-02068 2H | W73-02376 8B |
| bor, Massachusetts (Draft Environmental Im- | | Historical Changes of Estuarine Topography |
| pact Statement). | Concentration of Brines by Spray Evaporation, | With Question Of Future Management Policies, |
| W73-02262 4A | W73-02081 5E | W73-02464 5C |
| Small Book Harbon Brainst Bathal Alaska | HEATED WATER | materia |
| Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). | Fisheries, Cooling-Water Discharges and | HOMING Further Ultrasonic Tracking and Tagging Stu- |
| W73-02264 4A | Sewage and Industrial Wastes, | dies on Homing Cutthroat Trout (Salmo clarki) |
| *** | W73-02433 5C | in Yellowstone Lake, |
| A Study of Sediments from Bellingham Harbor | HEAVY METALS | W73-02577 2H |
| as Related to Marine Disposal, | Heavy Metal Ion Interaction and Transport | HOUSTON SHIP CHANNEL |
| W73-02461 5C | with Synthetic Complexing Agents and Deter- | The Eyes of Texas Are on U.S. Gypsum, |
| HARDPAN | gent Phosphate Substitutes in Aquatic Systems, | W73-02226 5D |
| Studies of Saprolite and Its Relation to the | W73-02112 5A | |
| Migration and Occurrence of Groundwater in | Contents and Behaviour of Mercury as Com- | HUMAN FACTORS Assessment of Turbidity, Color, and Odor in |
| Crystalline Rocks, | pared with Other Heavy Metals in Sediments | Water, |
| W73-01955 2F | from the Rivers Rhine and Ems, | W73-01971 5G |
| HARDWAAR BARRETS | W73-02158 5B | |
| HARDWOOD FORESTS Solar Radiation Absorption by Leafless Hard- | A Mass Balance Model of Trace Metals in | HUMAN POPULATION The Census and Water Utilities. |
| wood Forests, | Several Delaware WatershedsA Progress Re- | W73-02136 6D |
| W73-02569 2I | port, | W 73-02130 |
| | W73-02341 5B | HUNGARY |
| HARRIS COUNTY (TEX) | House Matel Anchors of Freehouster Massain | Weekly Changes of the Bacterio- and |
| Chemical Analyses of Water from Wells in | Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New | Phytoplankton Standing Stock in Lake Balaton |
| Harris County, Texas, 1922-71, | Hope Rivers, | and in the Highly Eutrophic Lake Belso, W73-02594 5C |
| W73-02038 2K | W73-02356 5A | |
| HAULM | | Comparative Investigations on the Benthic |
| Influence of Mist Irrigation on Growth, Yields, | The Effects of Divalent Metal Ions on the Micellar Properties of Sodium Dodecyl Sulfate, | Fauna at Two Sewage Inflows of Lake Balaton, |
| and Quality of Potatoes and Snap Beans, | W73-02557 2K | W73-02595 5C |
| W73-01966 3F | | |
| Man Tables of Miles Technology on the Water | HELSINKI (FINLAND) | HURRICANES |
| The Influence of Mist Irrigation on the Potato: | Survival and Leaching of Fecal Streptococci Under Field Conditions, | Meteorological and Hydrological Analysis of the August 27-28, 1971, New Jersey Flood, |
| II. Growth and Development, W73-02441 3F | W73-02143 5B | W73-02174 2A |
| Jr | | |

Ririe D (Draft E W73-019

> Hydroci Testing W73-02

IDAHO Ba Investig Batholit W73-025

Pondero and Hei W73-02:

ILLINOIS Yields of linois, W73-02

Glacial-W73-02

Yields of Illinois, W73-02

Yields of pian Ro W73-02

ILOWNIC The Go Bloch) Carp Po W73-02

IMPACT Some Failure W73-02 IMPERVI The As W73-02 IMPOUN Rodma W73-02 INCRUST Mainta W73-02

> The A Water W73-02

INDETEI Hydrol W73-02 INDEXIN Index o tober 1 W73-02 INDIA Water trict, U W73-02

Ecolog Rajasti W73-02

A Prog Waters

HURRICANES

| Alternative Adjustments to Natural Hazards, W73-02367 6F | A Dictionary of Hydrogeology and Engineering Geology (Slovar' po gidrogeologii i inzhenernoy geologii), | History of Water Level Gauges, LAKE Erie and The Niagara River. W73-02493 |
|--|--|--|
| HYBRID COMPUTERS | geologii), W73-02064 10A | THE STATE OF THE S |
| A Hybrid Computer Program for Predicting the | | HYDROLOGIC SYSTEMS |
| Chemical Quality of Irrigation Return Flows, W73-02177 5B | Radioisotope Investigation Techniques in En- gineering Geology and Hydrogeology | Hydrologic Modeling, W73-02547 2A |
| HYDRAULIC CONDUCTIVITY | (Radioizotopnyye metody issledovaniya v inz- | HYDROLOGY |
| Effect of Temperature on Pressure Head-Water Content Relationship and Conductivity of Two | henernoy geologii i gidrogeologii), W73-02328 8G | Hydrologic Investigations and Flow Computa- tions (Gidrologicheskiye issledovaniya i |
| Soils, | Geophysical, Geohydrological, and Geochemi- | raschety stoka). |
| W73-02339 2G | cal Reconnaissance of the Luke Salt Body, Central Arizona, | W73-02330 4A |
| HYDRAULIC DESIGN | W73-02480 2F | Form of the Relation Between Melt-Water |
| The Technical Aspects of Gravel Well Con- | Constitution averaged with the con- | Losses and Some Hydrologic Characteristics |
| struction, W73-02393 | A Regional Geophysical Investigation of the Green Bay Area. | (O vozmozhnoy forme zavisimosti poter' ta- lykh vod ot nekotorykh obuslovlivayushchikh |
| W 13-02393 | W73-02502 2H | faktorov), |
| Boundary Flow Considerations in the Design of | To compare the ball to be a second to | W73-02332 2E |
| Wells, W73-02394 8B | Hydrogeology of the Forty Mile Creek Drainage Basin on the South Shore of Lake | Proceedings, Fourteenth Conference on Great |
| W 73-02374 6B | Ontario, | Lakes Research. |
| Place Gravel Pack Properly for Best Results. | W73-02503 2H | W73-02498 2H |
| W73-02416 8B | TENNOCH AND ANALYSIS | HYDROTHERMAL STUDIES |
| A Proven Squeeze-Cementing Technique in a | Hydrologic Modeling. | Mathematical Description of Biological and |
| Dolomite Reservoir, | W73-02547 2A | Physical Processes in Heated Streams, |
| W73-02421 8F | TOTAL CONTRACTOR OF THE PARTY O | W73-02468 5C |
| HYDRAULIC MODELS | HYDROGRAPHS | HYPERTENSION |
| The Corps of Engineers Chesapeake Bay Stu- | A Program for Estimating Runoff from Indiana Watersheds, Part III Analysis of | Effect of Drinking Water with Different |
| dy, | Geomorphologic Data and a Dynamic Con- | Chloride Contents on Experimental Animals, |
| W73-02149 2L | tributing Area Model for Runoff Estimation, | (In Russian), W73-02020 5C |
| Sedimentation Characteristics of Gorge-Type | W73-01952 2A | W 15-02020 |
| Reservoirs, | Representative Rural Catchments in Kenya and | HYPOLIMNION |
| W73-02179 2J | Uganda, | Hypolimaion Aeration, |
| HYDRAULIC PROPERTIES | W73-02050 2A | W73-02137 5F |
| Boundary Flow Considerations in the Design of | HYDROLOGIC ASPECTS | Artificial Destratification in Reservoirs. |
| Wells, W73-02394 8B | Form of the Relation Between Melt-Water | W73-02138 5G |
| W/3-023-4 | Losses and Some Hydrologic Characteristics | ICE |
| Hydraulic Properties of Perforated Well Cas- | (O vozmozhnoy forme zavisimosti poter' ta- | Some Observations on Superimposition of Ice |
| ings, W73-02395 8B | lykh vod ot nekotorykh obuslovlivayushchikh faktorov), | on the Devon Island Ice Cap, N.W.T., Canada, |
| W13-02333 | W73-02332 2E | W73-02046 2C |
| HYDROCARBONS | HADDOLOGIC DATE | Computing Salinity Profiles in Ice, |
| Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, | HYDROLOGIC DATA Hydrologic Data Collection Via Geostationary | W73-02054 2C |
| W73-02449 5C | Satellite. | Engineering Glaciology (Inzhenernaya glyat- |
| | W73-02036 7A | siologiya). |
| HYDROELECTRIC PLANTS | Becards of Brasinitation Assistan Head and | W73-02060 2C |
| Niangua Hydro Project (Draft Environmental Impact Statement). | Records of Precipitation, Aquifer Head, and Ground-Water Recharge to the Edwards and | Summary of Current Research on Snow and |
| W73-02515 8C | Associated Limestones, San Antonio Area, | Ice in Canada. |
| Newhalem Creek Project, Washington (Draft | Texas,-1968. | W73-02310 2C |
| Environmental Impact Statement). | W73-02308 2F | Meltwater Gaging Program Project No 1, Ap- |
| W73-02522 8C | Annual Compilation and Analysis of Hydrolog- | proach Roads, Tuto Area, Greenland. |
| HYDROELECTRIC PROJECT LICENSING | ic Data for Little Elm Creek, Trinity River | W73-02486 2C |
| Niangua Hydro Project (Draft Environmental | Basin, Texas, 1970, W73-02324 7C | ICE BREAKUP |
| Impact Statement). | W13-02324 | Bedforms of the Tana River, Norway, |
| W73-02515 8C | Average Water Content of Snowpack in Maine, | W73-02047 2C |
| HYDROGEOCHEMISTRY | W73-02326 7C | ICE-CORED MORAINES |
| Radioisotope Investigation Techniques in En- | Floods in the Aguadilla-Aguada Area, | Ice-Cored Moraines in Southern British Colum- |
| gineering Geology and Hydrogeology | Northwestern Puerto Rico, | bia and Alberta, Canada, |
| (Radioizotopnyye metody issledovaniya v inz- henernoy geologii i gidrogeologii), | W73-02327 7C | W73-02042 2C |
| W73-02328 8G | Annual Compilation and Analysis of Hydrolog- | ICE COVER |
| | ic Data for Urban Studies in the Fort Worth, | Relation of Ice Freezeup Dates and Ice-Cover |
| HYDROGEOLOGY Bibliography on the Hydrogeology of Siberia | Texas, Metropolitan Area, 1970, | Duration to Elevation and Channel Slopes of Carpathian Rivers (O svyazi srokov |
| and the Soviet Far East for the Period 1918- | W73-02482 7C | ustanovleniya i prodoizhitel'nosti ledostava s |
| 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | Meltwater Gaging Program Project No 1, Ap- | vysotoy mestnosti i uklonami na rekakh Kar- |
| Bibliograficheskiy ukazatel'. 1918-1965), W73-02058 | proach Roads, Tuto Area, Greenland. | pat), W73-02337 |
| W73-02058 2F | W73-02486 2C | W73-02337 4A |

| IDAHO Ririe Dam and Lake, Willow Creek, Idaho | Geomorphologic Data and a Dynamic Con- tributing Area Model for Runoff Estimation, | INDUSTRIES Toward Effective and Equitable Pollution Con- |
|--|--|--|
| (Draft Environmental Impact Statement). | W73-01952 2A | trol Regulation, W73-02520 5G |
| W73-01988 8D | Highland Lake Fall Creek Basin, Indiana (Draft | |
| Hydrochemical Study of the National Reactor Testing Station, Idaho, | Environmental Impact Statement). W73-02253 8D | INFILTRATION Studies of Saprolite and Its Relation to the |
| W73-02484 5B | INDUSTRIAL WASTES | Migration and Occurrence of Groundwater in Crystalline Rocks, |
| IDAHO BATHOLITH | Determination of the Rate of Biodegradation in | W73-01955 2F |
| Investigation of Slope Failures in the Idaho Batholith. | Some Polluted Tropical Waters and in Some Types of Liquid Wastes Common in Puerto | INFLOW |
| W73-02564 · 2J | Rico, | Hydrogeology of the Forty Mile Creek |
| Ponderosa Pine Planting Techniques, Survival | W73-01973 5B | Drainage Basin on the South Shore of Lake Ontario, |
| and Height Growth in the Idaho Batholith, W73-02579 4A | Water Quality Criteria Data Book - Volume 3: Effects of Chemicals on Aquatic Life, Selected | W73-02503 2H |
| | Data from the Literature Through 1968. | INFORMATION DISSEMINATION |
| ILLINOIS Yields of Deep Sandstone Wells in orthern Il- | W73-01976 5C | Evaluation of Selected Aspects of Communica- tion of Water Resources Research Information |
| linois, W73-02386 3B | Chlorobiphenyls (PCBs) in the Milwaukee River, | Among University Researchers and Users, W73-02357 6B |
| Ballacia Company and and a second and | W73-02084 5C | |
| Glacial-Drift Gas in Illinois, W73-02391 8D | The Effects of Sewer Surcharges on the Level | INFORMATION RETRIEVAL Evaluation of Selected Aspects of Communica- |
| Yields of Shallow Dolomite Wells in Northern | of Industrial Wastes and the Use of Water by | tion of Water Resources Research Information |
| Illinois, | Industry, W73-02115 5G | Among University Researchers and Users, W73-02357 6B |
| W73-02399 4B | Water Pollution by Oil-Field Brines and Re- | INJECTION |
| Yields of Wells in Pennsylvanian and Mississip- | lated Industrial Wastes in Ohio, | A Proven Squeeze-Cementing Technique in a |
| pian Rocks in Illinois, W73-02400 4B | W73-02192 5B | Dolomite Reservoir, W73-02421 8F |
| ILOWNICA RIVER | Regeneration of Steelworks Hydrochloric Acid | |
| The German Carp (Carassius auratus gibelio | Pickle Liquor, W73-02198 5D | INJECTION WELLS Interpretation of Temperature Logs in Water- |
| Bloch) from the Ilownica River Stocked in a Carp Pond, | Industrial Waste and the Small City. | and Gas-Injection Wells and Gas-Producing Wells, |
| W73-02026 8I | W73-02214 5D | W73-02405 8G |
| IMPACT ENERGY | Saving the Dragout Keeps Plater Within | INJUNCTIONS (MANDATORY) |
| Some Results of Dri Investigations-Rock Failure in Percussion, | Discharge Limits, W73-02227 5D | Sierra Club V. Froehlke (Judicial Review of Environmental Impact Statement). |
| W73-02406 8E | | W73-02238 6E |
| IMPERVIOUS LININGS | The Ministry's Memorandum on 'Standards of Effluents to Rivers With Particular Reference | INJUNCTIONS (PROHIBITORY) |
| The Asphaltic Lining of Dungonnel Dam, | to Industrial Effluents': A Review, | Louisiana Irrigation and Mill Co. V. Pousson |
| W73-02073 8A | W73-02228 5G | (Injunctive Relief to Protect and Aqueduct Ser- vitude). |
| IMPOUNDED WATERS Rodman Drawdown Saves Trees, | User Charges as a Means for Pollution Control: The Case of Sewer Surcharges, | W73-02236 6E |
| W73-02258 6E | W73-02359 5G | Discon V. Saray, Inc. (Access Rights of Lan- |
| INCRUSTATION | Sewer Surcharges and Their Effect on Water, | downers Bordering Navigable Canal). W73-02237 6E |
| Maintaining Water Well Yield, W73-02369 8G | W73-02360 5G | INPUT-OUTPUT ANALYSIS |
| | The Industrial Demand for Water and Waste | Hydrologic Modeling, |
| The Analytical Control of Anti-Corrosion Water Treatment, | Treatment in Selected U.S. Cities Which are Levying Surcharges, | W73-02547 2A |
| W73-02411 5F | W73-02361 5G | INSECTICIDES Transfer of Particides Through Water Sadi |
| INDETERMINISTIC MODELS | Fisheries, Cooling-Water Discharges and | Transfer of Pesticides Through Water, Sedi- ments and Aquatic Life, |
| Hydrologic Modeling, W73-02547 2A | Sewage and Industrial Wastes, W73-02433 5C | W73-01959 5B |
| | Prevention of Pollution From the Industrial | Effects of an Organophosphorus Insecticide on |
| INDEXING Index of Surface Water Stations in Texas, Oc- | Use of Oil, | the Phytoplankton, Zooplankton, and Insect Populations of Fresh-Water Ponds, |
| tober 1972. W73-02311 7C | W73-02434 5D | W73-02453 5C |
| | INDUSTRIAL WATER | INSECTS |
| Water Table Fluctuations in the Meerut Dis- | Inventory of Water Diversions and Rate Struc- tures for Cities, Towns, and Villages in New | Effects of an Organophosphorus Insecticide on the Phytoplankton, Zooplankton, and Insect |
| trict, Uttar Pradesh, India, | Mexico, W73-01963 6C | Populations of Fresh-Water Ponds, W73-02453 5C |
| W73-02044 4B | | |
| Ecology of Jalore District in Western Rajasthan, | Water for Industrial Needs: What, Where, When, | INSTALLATION Procedures for Installing Well Screens. |
| W73-02600 4A | W73-02139 3E | W73-02415 8A |
| INDIANA | The Effect of Water Resources on Industrial | INSTITUTIONAL CONSTRAINTS |
| A Program for Estimating Runoff from Indiana Watersheds, Part III Analysis of | Growth in the Tennessee Valley Region, W73-02562 3E | Water Resource Planning. W73-02368 6B |
| and the state of t | \$18 King | |

Louisiana (Injunctiv vitude). W73-0223

IRRIGATIO Drain and W73-0235 IRRIGATIO Irrigation ness, W73-0254 IRRIGATIO MAINTENA Irrigation ness, W73-0254 IRRIGATIO Soil Asso Irrigation, W73-0211 ISLANDS Hydrobiol Island: 19 W73-0258

ISOCHRON Runoff

Isochrone zareguliro uchastkak W73-0233

ISOTOPE S

Radioisote gineering (Radioizo

henernoy W73-0232

The Fun Ecologica

W73-0219 Optimizin System, W73-0228

The Deve W73-0229

Alternativ Italian), W73-0216

JACKSON (Measuren W73-0214

JALORE (R Ecology Rajasthan W73-0260

JAPAN Note or Chironom (In Japane W73-0258

JAPANESE Quantitati the Produ Bays of the sian), W73-0259

8A

| Effects of Institutional Constraints and Resources Planning on Growth in and Near Estuaries, | INTERTIDAL AREAS Hydraulic Parameters Controlling Bedform Migration on an Intertidal Sand Body, | Sunrise Subwatershed, Little Sioux Flood Prevention Project, Iowa (Draft Environmental Impact Statement). |
|--|---|---|
| W73-02465 5C | W73-02489 2L | W73-02263 4D |
| INSTITUTIONS | INVERTEBRATES | Mather V. State (Ownership of Accretion to |
| Laws for a Better Environment. W73-02560 6E | The West Falmouth Oil Spill. I. Biology, W73-02023 5C | Islands in a Navigable Stream). W73-02532 6E |
| Objectives of Water Resource Management - | | Economic Analysis of Alternative Water Pollu- |
| Can They Be Achieved Through Legislation, W73-02561 6E | INVESTIGATIONS Hydrologic Investigations and Flow Computa- | tion Control Measures, W73-02550 5G |
| W 75-02501 | tions (Gidrologicheskiye issledovaniya i raschety stoka). | |
| NSTRUMENTATION | W73-02330 4A | IRON Transition Metals of Impounded Waters, |
| Development of a Tape Transport Bacterial De- tection System; Final Report, | | W73-01953 SB |
| W73-02012 5A | INVESTMENT | |
| | Principles and Problems of Municipal Financ- ing, | Determination of Manganese, Copper, and Iron in Human Blood by Neutron Activation Analy- |
| Automated Separations in Routine Activation Analysis of Mercury, | W73-02289 6C | sis, |
| W73-02015 5A | Modeling and Sensitivity Analysis for Planning | W73-02018 5A |
| Advances in Analytical Chemistry and Instrumentation. Volume 9 - Spectrochemical | Decisions in Water Resources Expansion, W73-02541 4A | Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Deter- |
| Methods of Analysis. | ION EXCHANGE | gent Phosphate Substitutes in Aquatic Systems, W73-02112 5A |
| W73-02096 5A | Wastewater Treatment by Ion Exchange, | W/3-02112 |
| Measurement of Low Turbidities, W73-02147 SA | W73-02202 5D | Maintaining Water Well Yield, W73-02369 8G |
| W73-02147 5A | Anion Exchange Equilibria Involving | |
| A Quantitative Evaluation of Dissolved Oxygen | Phosphate, Sulphate and Chloride, | IRON BACTERIA |
| Instrumentation, | W73-02208 5D | Maintaining Water Well Yield, W73-02369 8G |
| W73-02165 5B | Anion Exchange and Filtration Techniques for | |
| Water Quality Measurements with Airborne Multispectral Scanners, | Wastewater Renovation, W73-02537 5D | Microbiological Corrosion of Iron and Steel, W73-02403 8G |
| W73-02182 5A | | Microbiological Compaign in Water Floods |
| Neptune Meter Company's New Water Meter | The Effects of Divalent Metal Ions on the Micellar Properties of Sodium Dodecyl Sulfate, | Microbiological Corrosion in Water Floods, W73-02404 |
| Manufacturing Facility. W73-02216 8C | W73-02557 2K | IRON COMPOUNDS |
| | ION FLOTATION | Effect of Lime Neutralized Iron Hydroxide |
| The Economics of Automation in Wastewater | Separation of Lignin from Aqueous Solution by | Suspensions on Juvenile Brook Trout (Salvelinus Fontinalis, Mitchill), |
| Treatment, W73-02293 5D | Adsorptive Bubble Separation Processes, W73-02350 5D | W73-02277 5C |
| | | Secondary Depositon of Iron Compounds Fol- |
| An Automated System for Determining Estuarine Bathymetry, | ION PAIRING | lowing Acidizing Treatments, |
| W73-02317 7B | Physical Chemistry of Extraction Processes, W73-02014 1B | W73-02420 8G |
| Water Quality Characteristics and Their Man | 115 | IRON HYDROXIDE |
| Water Quality Characteristics and Their Mea- surement. | ION-SELECTIVE ELECTRODES | Effect of Lime Neutralized Iron Hydroxide |
| W73-02427 5A | Heavy Metal Ion Interaction and Transport with Synthetic Complexing Agents and Deter- | Suspensions on Juvenile Brook Trout (Salvelinus Fontinalis, Mitchill), |
| Automatic System for Monitoring Water Quali- | gent Phosphate Substitutes in Aquatic Systems, | W73-02277 5C |
| ty, | W73-02112 5A | TO A MORE THO |
| ty, W73-02432 5A | ION TRANSPORT | IRON PICKLING Regeneration of Steelworks Hydrochloric Acid |
| NTERCEPTION | Heavy Metal Ion Interaction and Transport | Pickle Liquor, |
| Reservoir Yield in Arid Regions with Limited Records, | with Synthetic Complexing Agents and Deter- gent Phosphate Substitutes in Aquatic Systems, | W73-02198 5D |
| W73-02545 2A | W73-02112 5A | IRRADIATION |
| INTERCEPTOR SEWERS | Mobilities of Injected Ions in Liquid Water, | Kinetics of Algal Biomass Production Systems |
| Oneida Shows the Way To Go, | W73-02114 5A | with Respect to Intensity and Nitrogen Concen- tration, |
| W73-02196 5D | | W73-02218 5C |
| INTERFLUVIAL ZONE | IOWA Diatoms from Seven Iowa Rivers, | IRRIGABLE LAND |
| Aquatic and Marsh Vegetation of the Timis- | W73-02011 2I | Soil Associations and Land Classification for |
| Bega Interfluvial Zone, W73-02316 4A | Recharge to Ground Water from the West | Irrigation, Socorro County, W73-02117 3F |
| NTERNAL WAVES | Nishnabotna River, W73-02033 4B | IRRIGATION |
| Experimental Investigation of the Spatial Form | | Effect of Mineral Fertilizers and Irrigation on |
| of Large Internal Waves in a Near-Shore Re- gion of Lake Huron, | Conrad V. Board of Supervisors of Lee County (Extent of Liability for Pollution of Private | the Yields of Basic Crops, (In Russian), W73-02007 3F |
| W73-02506 2H | Pond). | |
| INTERNATIONAL COMMISSIONS | W73-02244 6E | IRRIGATION CANALS Tehama-Colusa, Central Valley Project, |
| Oil Pollution Act Amendments of 1972 (H.R. 15627), | McCarthy V. Cullen and Son Corp. (Liability for Alteration of Surface Water Drainage). | California (Final Environmental Impact Statement). |

W73-02528

6E

W73-02245

6E

W73-01994

| Louisiana Irrigation and Mill Co. V. Pousson (Injunctive Relief to Protect and Aqueduct Ser- | JENSEN-HAISE METHOD Irrigation Management-A Tool for Agribusi- | KARST STUDIES Karst in Carbonate Rocks (Karst v karbonat- |
|---|--|--|
| vitude). | ness, | nykh porodakh). |
| W73-02236 6E | | W73-02059 2F |
| IRRIGATION DESIGN | JETS Let Classics of Water Wells Described | KARST TOPOGRAPHY |
| Drain and Irrigate with the Same System, W73-02353 3F | Jet Cleaning of Water Wells Described. W73-02417 8B | Karst in Carbonate Rocks (Karst v karbonat- nykh porodakh). |
| IRRIGATION EFFICIENCY | JOINTS (GEOLOGIC) | W73-02059 2F |
| Irrigation Management-A Tool for Agribusi- | Initiation of Ground-Water Flow in Jointed | KAZAKHSTAN |
| ness, | Limestone, W73-02375 4B | Formation and Calculation of Elements of the |
| W73-02546 3F | W73-02375 4B | Water Balance for Small Watersheds of |
| IRRIGATION OPERATION AND | JUDICIAL DECISIONS | Northern Kazakhstan (Formirovaniye i |
| MAINTENANCE Irrigation Management—A Tool for Agribusi- | Discon V. Saray, Inc. (Access Rights of Landowners Bordering Navigable Canal). | raschety elementov vodnogo balansa malykh vodosborov Severnogo Kazakhstana). |
| ness, | W73-02237 6E | W73-02065 2A |
| W73-02546 3F | Sierra Club V. Froehlke (Judicial Review of | KAZAKHSTAN (USSR) |
| IRRIGATION POTENTIAL | Environmental Impact Statement). | Erosion and Deflation of Soils (In Russian), |
| Soil Associations and Land Classification for | W73-02238 6E | W73-02163 2J |
| Irrigation, Socorro County, W73-02117 3F | Gregory V. City of New York (Non-Resident | KENOSHA (WIS) |
| W/3-0211/ | Riparian Landowner's for Upstream Diversion | Kenosha Increases Plant Capacity with Micros- |
| ISLANDS | by Municipality). | trainers, |
| Hydrobiological Research on Amsterdam Island: 1969-1970 Exploratory Campaign, | W73-02239 6E | W73-02426 5F |
| W73-02582 2I | Minnesota Pollution Control Agency V. Hat- | KENTUCKY |
| ISOCHRONES | field (Public Expenditures for Water Pollution Abatement as a Legitimate Public Purpose). | Industrial Waste and the Small City. |
| Runoff Coefficients for Areas Between | W73-02240 6E | W73-02214 5D |
| Isochrones (O koeffitsiyentakh yestestvennogo | Christoffels V. Alton Properties, Inc. (Private | Camp Ground Lake, Salt River Basin, Ken- |
| zaregulirovaniya stoka na mezhizokhronnykh uchastkakh). | Suits Barred Under State Statute Pertaining to | tucky (Draft Environmental Impact Statement). |
| W73-02331 4A | Filling in of Lakes). | W73-02269 8A |
| | W73-02243 6E | Evaluating Recreational Potential of Small |
| Radioisotope Investigation Techniques in En- | McCarthy V. Cullen and Son Corp. (Liability | Streams, |
| gineering Geology and Hydrogeology | for Alteration of Surface Water Drainage). | W73-02297 6B |
| (Radioizotopnyye metody issledovaniya v inz- | W73-02245 6E | KENYA |
| henernoy geologii i gidrogeologii), W73-02328 8G | Defending the Environment-A Case History, | Representative Rural Catchments in Kenya and |
| W 73-02328 | W73-02250 6E | Uganda, |
| ISRAEL | Courts and Water, The Role of the Judicial | W73-02050 2A |
| The Functional Adaptation of Lichens to Ecological Conditions of Arid Areas, | Process, | KIEL BAY |
| W73-02193 21 | W73-02365 6E | Biomass and Production of Macrobenthos in |
| Optimizing the Operation of Israel's Water | Mather V. State (Ownership of Accretion to | the Deeper parts of Kiel Bay in 1968, W73-02094 2L. |
| System, | Islands in a Navigable Stream). W73-02532 6E | |
| W73-02287 6B | | KILLIFISHES Elemental Composition of the Estuarine |
| The Development of Israel's Water Resources, | Dow Chemical Co. V. Dixie Carriers, Inc. (Private Canal Subject to Regulation Under | Teleost Fundulus Heteroclitus (L.), |
| W73-02292 6B | Rivers and Harbors Act). | W73-02278 5C |
| ITALY | W73-02533 6E | KINEMATIC WAVE THEORY |
| Alternatives for Fluoridation of Aqueducts (In | JUNCTION CITY (OREGON) | A Nomograph Based on Kinematic Wave |
| Italian), | Objectives of Water Resource Management - | Theory for Determining Time of Concentration |
| W73-02160 5G | Can They Be Achieved Through Legislation, W73-02561 6E | for Overland Flow, W73-02322 8B |
| JACKSON CANDLE | | |
| Measurement of Low Turbidities, W73-02147 5A | KANDALAKSHA BAY Comparative Study of the Ecology of Free-Liv- | KLENOVSKA RESERVOIR Vegetation of the Area of the Future Reservoir |
| | ing Ciliates in the Rugozersky Inlet (Kan- | on the Klenovska Rimava, |
| JALORE (RAJASTHAN) Ecology of Jalore District in Western | dalaksha Bay, White Sea), | W73-02087 2I |
| Rajasthan, | W73-02585 5C | KOETTLITZ GLACIER (ANTARCTICA) |
| W73-02600 4A | KARST | On the Use of Stable Isotopes to Trace the |
| JAPAN | Karst in Carbonate Rocks (Karst v karbonat- nykh porodakh). | Origins of Ice in a Floating Ice Tongue, |
| Note on the Swimming Behavior of | W73-02059 2F | W73-02168 2C |
| Chironomus Plumosus Larvae in Lake Suwa, (In Japanese). | KARST AREAS | KREMENCHUG RESERVOIR |
| (In Japanese), W73-02586 2H | Karst in Carbonate Rocks (Karst v karbonat- | Pike Rations in the Kremenchung Reservoir (In |
| JAPANESE SEA | nykh porodakh). | Russian), W73-02596 2H |
| Quantitative Description of the Initial Links of | W73-02059 2F | |
| the Production Process in the Shallow-Water | KARST HYDROLOGY | KREMENCHUG RESERVOIR (USSR) |
| Bays of the Posiet Bau (Japanses Sea), (In Rus- | Karst in Carbonate Rocks (Karst v karbonat- nykh porodakh). | Characterization of Phenols in Areas of Water 'Blooming' in Open Bodies of Water, |
| sian), W73-02597 . 5C | mykn porodakn). W73-02059 2F | W73-02460 5C |
| | | |

LASER LI Multiple Water, W73-021 LAUNDER Technica Laundry W73-023

LAW ENF Christof Suits Ba Filling in W73-022 In Re Jo risdiction Conserva Chemica W73-022

Chemica tions und W73-022

Defendin W73-022 LAW OF T Analysis Seabeds W73-025 LAWRENC Industria W73-022 LEACHING Survival Under Fi W73-0214 Contribut in a Sand W73-0216 LEADING (Leading (W73-0226 LEAF TEM Leaf Ten ments of Colombia W73-0219 LEAKAGE Water Uti W73-0243 Water-Re Wheat Le to Their Desiccation W73-0212 Diffusion with their .'73-0213 After Ef

Processes

Different | W73-02134

23

5C

W73-02564

LABORATORY TESTS

| ABORATORY TESTS | LAKE MICHIGAN | LAKE SUWA (JAPAN) |
|--|---|--|
| Some Results of Dri Investigations-Rock | A Regional Geophysical Investigation of the | Note on the Swimming Behavior of |
| Failure in Percussion, W73-02406 8E | Green Bay Area, W73-02502 2H | Chironomus Plumosus Larvae in Lake Suwa (In Japanese), |
| Kinetics of Biologically Mediated Aerobic Ox- | Divine Techniques Head in the Study of Res | W73-02586 2E |
| idation of Organic Compounds in Receiving | Diving Techniques Used in the Study of Fer- romanganese Nodule Deposits, | LAKE WINGRA (WIS.) |
| Waters and in Waste Treatment, W73-02450 5C | W73-02513 2H | Multivariate Approaches to Algal Strategies and Tactics in the Systems Analysis of |
| · con a series and | Utilization of Alewives by Inshore Piscivorous | Phytoplankton, |
| ACKAWANNA RIVER (PENN) | Fishes in Lake Michigan, | W73-02469 50 |
| 15 Towns Join Hands, W73-02223 5D | W73-02578 2H | LAKES |
| 113-02223 | LAKE MJORN | Thermal Effects of Power Plants on Lakes, |
| AKE ALLATOONA (GEO) Transition Metals of Impounded Waters, | The Littoral Vegetation at Lake Mjorn in | W73-02068 21 |
| W73-01953 5B | Western Vastergotland, (In Swedish), W73-02104 2H | A Water Quality Model for a Conjunctive Sur |
| | W/3-02104 2H | face-Groundwater System: An Overview, |
| AKE BALATON (HUNGARY) | LAKE MORPHOLOGY | W73-02178 51 |
| Weekly Changes of the Bacterio- and | A Regional Geophysical Investigation of the | THE STATE OF STREET |
| Phytoplankton Standing Stock in Lake Balaton and in the Highly Eutrophic Lake Belso, | Green Bay Area, | Nitrogen Fixation in Lakes, |
| W73-02594 5C | W73-02502 2H | W73-02472 50 |
| | TAPE OF THE OPENING | The Coastal Boundary Layers of a Lake, |
| Comparative Investigations on the Benthic | Hamlin Beach State Park Cooperative Beach | W73-02508 28 |
| Fauna at Two Sewage Inflows of Lake Balaton, | Erosion Control Project, Lake Ontario, Mon- | |
| W73-02595 5C | roe County, New York (Draft Environmental | Age, Growth, and Downstream Migration of |
| 113-02373 | Impact Statement). | Juvenile Rainbow Trout (Salmo gairdneri) in |
| AKE BELSO (HUNGARY) | W73-02261 8A | Lake Michigan Tributary, W73-02574 |
| Weekly Changes of the Bacterio- and | | W /3-023/4 |
| Phytoplankton Standing Stock in Lake Balaton | Annotated Bibliography of Lake Ontario Lim- | Feeding, Dietary Interrelationships of Fish an |
| and in the Highly Eutrophic Lake Belso, W73-02594 5C | nological and Related Studies. I Chemistry, W73-02443 5C | the Effectiveness of Their Use of Foo |
| | And the second | Resources in Natural Bodies of Water in th |
| AKE DARGIN | Seismic Profiling and Geology of the Toronto | Byelorussian Polesya. II. Diet of Goldfish i |
| The Effect of Ecological Conditions on the | Waterfront Area of Lake Ontario, | Lakes, W73-02590 21 |
| Parasite Fauna of Perch Perca Fluviatilis L. In | W73-02501 2H | W 73-02390 |
| Lake Dargin, W73-02500 5C | Hydrogeology of the Forty Mile Creek | LAND CLASSIFICATION |
| W/3-02300 3C | Drainage Basin on the South Shore of Lake | Soil Associations and Land Classification for |
| AKE ERIE | Ontario, | Irrigation, Socorro County, |
| Chemical and Sediment Movement from | W73-02503 2H | W73-02117 |
| Agricultural Land into Lake Erie, | | LAND DISPOSAL |
| W73-01957 5B | An Investigation of Horizontal Diffusion in | Control of Nitrate Contamination of Groun |
| Information on the Velocity and Flow Pattern | Lake Ontario, W73-02507 2H | Water Associated with Land Disposal of Mu |
| of Detroit River Water in Western Lake Erie | W13-02501 | nicipal Sewage, |
| Revealed by an Accidental Salt Spill, | Winter Circulation in Lake Ontario, | W73-02111 51 |
| W73-02057 5B | W73-02509 2H | The state of the s |
| Winter of Water Land Course LAVE Prin | | LAND MANAGEMENT |
| History of Water Level Gauges, LAKE Erie and The Niagara River. | Transport in the Baroclinic Coastal Current | Eagle-Tumbleweed Draw Watershed, New |
| W73-02493 7C | Near the South Shore of Lake Ontario in Early | Mexico (Draft Environmental Impact State |
| 113-02-03 | Summer, W73-02510 2H | ment). W73-01985 |
| Lake Erie Nearshore Sediments-Fort Erie to | W73-02510 2H | 41,3-01,703 |
| Mohawk Point, Ontario, | Development of Numerical Models of Lake | LAND USE |
| W73-02504 2H | Ontario, | Pave the Wetlands or Let Them Be, |
| AKE GENEVA | W73-02511 2H | W73-02252 |
| Introduction to Study of the Chemical Relation- | E APP OPPLIATION | F A SIDERY F G |
| ships Between the Sediments on the Bottom | LAKE SEDIMENTS Introduction to Study of the Chemical Relation- | Pollution of Subsurface Water by Sanitar |
| and the Water of the Lake of Geneva, | ships Between the Sediments on the Bottom | Landfills. Vol 2, |
| W73-02592 5C | and the Water of the Lake of Geneva, | W73-02106 5 |
| AKE HURON | W73-02592 5C | CONTRACT OF CONTRACT OF STATE |
| Experimental Investigation of the Spatial Form | | Pollution of Surface Water by Sanitary Land |
| of Large Internal Waves in a Near-Shore Re- | LAKE SIDNEY LANIER (GEO) | fills. Vol 3, |
| gion of Lake Huron, | A Study of the Effects of Island Development | W73-02107 |
| W73-02506 2H | on Lake Water Quality, | LANDSLIDES |
| AWE WARM CONTAMINATED | W73-01954 5C | Subsurface Water as a Major Factor in the For |
| Observations of Declining Water Lettuce Popular | LAKE SUPERIOR | mation of Landslides on the Left Bank of th |
| Observations of Declining Water Lettuce Populations in Lake Izabal, Guatemala, | Taxonomy of North Shore Periphyton, Lake | Chirchik River (Podzemnyye vody-osnovno |
| W73-02549 2H | Superior, Castle Danger Studies 1970-1971, | faktor formirovaniya opolzney levoberezh'y |
| 20 | W73-02555 5C | Chirchika), |
| AKE MCDONALD | | W73-02066 |
| Tsuga Heterophylla Forest at Lake McDonald, | Pollution and the Ecology of Nearshore | Investigation of Clary Pathers in the Cart |
| Glacier National Park, U.S.A., and its | Periphyton of Lake Superior: The Effects of | Investigation of Slope Failures in the Idah |
| Phytogeography, | Calefaction on Periphyton, | Batholith, |

Glacier National Park, U.S.A., and its Phytogeography, W73-02201 4A

W73-02556

5C

5F

| LASER LIGHT Multiple Scattering of Laser Light from Turbid | Frosthardiness of Apple Trees Scored According to the Water Retention Ability of Leaves | LEPTODORA KINDTII The Contribution of Leptodora and Other |
|---|---|--|
| Water, | (In Czechoslovakian), W73-02164 2D | Zooplankton to the Diet of Various Fish, |
| W73-02181 5B | W/3-02104 2D | W73-02031 5C |
| LAUNDERING | LEGAL REVIEW | LEUCISCUS-LEUCISCUS |
| Technical Evaluation of Phosphate-Free Home | In Re Johnson Orchards and Farms, Inc. (Jurisdiction of Department of Environmental | Dace (Leuciscus Leuciscus L.) from the Upper |
| Laundry Detergents, W73-02351 5C | Conservation over Accidental Discharge of | Vistula and Czarna Przemsza, W73-02090 21 |
| W 73-02331 | Chemicals in State Waterway). | W73-02090 2I |
| LAW ENFORCEMENT | W73-02246 6E | LEVEES |
| Christoffels V. Alton Properties, Inc. (Private | LEGISLATION | Local Protection and Floodproofing Project, |
| Suits Barred Under State Statute Pertaining to Filling in of Lakes). | Repair and Protect Our Natural Environment, | Matewan, West Virginia, Tug Fork of Big Sandy River (Draft Environmental Impact |
| W73-02243 6E | W73-01993 6E | Statement). |
| In Re Johnson Orchards and Farms, Inc. (Ju- | Proposed Principles and Standards for Planning | W73-01991 8A |
| risdiction of Department of Environmental | Water and Related Land Resources. | Hydrometeorological Relationships and Their |
| Conservation over Accidental Discharge of | W73-02231 6E | Effects on the Levees of a Small Arctic Delta, |
| Chemicals in State Waterway). | The Problems and Issues of Implementing Na- | W73-02041 8D |
| W73-02246 6E | tional Water Legislation at Subnational Levels, W73-02242 6E | LEXINGTON (KENT) |
| United States V. Pennsylvania Industrial | W13-02242 | Evaluating Recreational Potential of Small |
| Chemical Corp. (Defenses to Criminal Prosecu- | Christoffels V. Alton Properties, Inc. (Private | Streams, |
| tions under the Refuse Act). W73-02247 6E | Suits Barred Under State Statute Pertaining to Filling in of Lakes). | W73-02297 6B |
| W. 13-02247 | W73-02243 6E | LICHENS |
| Defending the Environment-A Case History, | Haited States W Benevitaria Industrial | The Functional Adaptation of Lichens to |
| W73-02250 6E | United States V. Pennsylvania Industrial Chemical Corp. (Defenses to Criminal Prosecu- | Ecological Conditions of Arid Areas, |
| LAW OF THE SEA | tions under the Refuse Act). | W73-02193 21 |
| Analysis of Actions of the United Nations | W73-02247 6E | The Ambient Environment of Lichens as a |
| Seabeds Committee, | Pave the Wetlands or Let Them Be, | Function of Exterior Atmospheric Conditions |
| W73-02527 6E | W73-02252 6E | Existing in the Locality, W73-02290 2I |
| LAWRENCEBURG (KENT) | Prompt Passage of Ocean Dumping Bill is | |
| Industrial Waste and the Small City. | Urged, | LIFE HISTORY STUDIES |
| W73-02214 5D | W73-02255 6E | Studies on Algal Growth, Development, and Reproduction, |
| LEACHING | Conference Report on S.2770, Amending | W73-02099 5C |
| Survival and Leaching of Fecal Streptococci | Federal Water Pollution Control Act. | |
| Under Field Conditions, W73-02143 5B | W73-02256 6E | LIGHT INTENSITY Kinetics of Algal Biomass Production Systems |
| W15-02143 | Public Works on Rivers and Harbors (Bill | with Respect to Intensity and Nitrogen Concen- |
| Contribution to the Study of Nitrogen Leaching | S.4018). | tration, |
| in a Sandy Soil ('Dior') in Senegal, W73-02161 5G | W73-02257 6E | W73-02218 5C |
| | Legal Protection of the Pacific Northwest | The Impact of Reduced Light Penetration on a |
| LEADING CREEK CONSERVANCY DISTRICT | Estuaries, W73-02459 5C | Eutrophic Farm Pond, |
| Leading Creek Conservancy District (Final Environmental Impact Statement). | W13-02439 | W73-02349 5C |
| W73-02267 5F | Maintenance of Water Quality-Alberta's | LIGHT PENETRATION |
| | Legislative Scheme and the Common Law, W73-02525 5G | Multiple Scattering of Laser Light from Turbid |
| LEAF TEMPERATURE Leaf Temperature and Transpiration Measure- | | Water, W73-02181 SB |
| ments of Tribulus Cistoides L. In Northern | The Need to Control Ocean Dumping, | W73-02181 5B |
| Colombia, | W73-02526 6E | The Impact of Reduced Light Penetration on a |
| W73-02195 2D | Analysis of Actions of the United Nations | Eutrophic Farm Pond, W73-02349 5C |
| LEAKAGE | Seabeds Committee, W73-02527 6E | |
| Water Utility Distribution Loss, | | LIGHTHOUSES |
| W73-02431 5G | Oil Pollution Act Amendments of 1972 (H.R. | Marine Aids to Navigation - Selection and |
| LEAVES | 15627), W73-02528 6E | Design, W73-02463 5C |
| Water-Retaining Forces of the Cells of Winter | | |
| Wheat Leaves and Tillering Nodes with Regard | Conference Report on the Federal Water Pollu- tion Control Act Amendments of 1972, | LIGNINS Separation of Lignin from Aqueous Solution by |
| to Their Resistance to Slow Freezing and Desiccation (In Russian), | W73-02530 5G | Adsorptive Bubble Separation Processes, |
| W73-02123 3F | Laws for a Better Environment. | W73-02350 SD |
| | W73-02560 6E | LIME |
| Diffusion Resistance of Leaves in Connection with their Anatomy (In Russian), | | Effect of Lime-Treated Water Upon Survival |
| .'73-02133 (2I | Objectives of Water Resource Management - Can They Be Achieved Through Legislation, | of Bacteria, |
| | W73-02561 6E | W73-02148 5F |
| After Effect of Atmospheric Drought of Coupling of Oxidation and Phosphorylation | LEOPARD FROGS | LIME-TREATED WATER |
| Processes in the Leaves of Bean Plants with | Under-Ice Observations of Wintering Sites of | Effect of Lime-Treated Water Upon Survival |
| Different Drought-Resistance (In Russian), | Leopard Frogs, | of Bacteria, |
| W73-02134 3F | W73-02583 2C | W73-02148 5F |

LIMESTONES

| LIMESTONES | Regional Government in New England: A | LUCERNE-D |
|--|---|--|
| Initiation of Ground-Water Flow in Jointed | Prototype, | Changes of Soil Moisture Under Lucerne and |
| Limestone, | W73-02304 6G | Maize Stands Grown for Green Mass (In |
| W73-02375 4B | | Czech), |
| | LOG INTERPRETATION | W73-02142 2G |
| LIMITING FACTORS | Electric Logging Applied to Ground Water Ex- | LUKE SALT BODY (ARIZ) |
| Investigations on Nutrient Factors Limiting | ploration, | Geophysical, Geohydrological, and Geochemi- |
| Phytoplankton Productivity in Two Central Vir- | W73-02402 8G | cal Reconnaissance of the Luke Salt Body, |
| ginia Ponds, | LOGGING | Central Arizona, |
| W73-02452 5C | | W73-02480 2F |
| LIMNOLOGY | Water Temperature in the Steamboat Drainage, W73-02567 | 21 |
| A Survey of the Benthic Macroinvertebrate | W/3-0256/ | MACHIASPORT (MAINE) |
| Populations in the New Hope and Lower Haw | Some Effects of Logging and Associated Road | Bucks Harbor, Machiasport, Maine (Final En- |
| Rivers, | Construction on Northern California Streams, | vironmental Impact Statement). |
| W73-02355 5B | W73-02573 4C | W73-02234 8A |
| W 15-02555 | 11.5 02.5 | TO SECURE AND ADDRESS OF THE PARTY OF THE PA |
| Proceedings, Fourteenth Conference on Great | LOGGING (RECORDING) | MACROPHYTES |
| Lakes Research. | The Delta-Log, a Differential Temperature Sur- | The Impact of Reduced Light Penetration on a |
| W73-02498 2H | veying Method, | Eutrophic Farm Pond, |
| | W73-02380 8G | W73-02349 50 |
| INEAR PROGRAMMING | | MADISON (WIS) |
| Economic Analyses of Optimal Water Quality | The Use of Acoustic Logs in the Evaluation of | Ways in Which a Resident of the Madison |
| Management, | Sandstone Reservoirs, | Lakes' Watershed may Help to Improve Water |
| W73-01951 5G | W73-02401 8G | Quality in the Lakes, |
| Date of the second seco | | W73-02479 50 |
| LININGS | Interpretation of Temperature Logs in Water- | |
| The Asphaltic Lining of Dungonnel Dam, | and Gas-Injection Wells and Gas-Producing | MAGNESIUM BISULFITE |
| W73-02073 8A | Wells, | Magnesium Bisulfite Recovery Startup, |
| LIPIDS | W73-02405 8G | W73-02224 5D |
| | Photographic Examination of Wells, | |
| Chemical Responses by Marine Organisms to | W73-02409 8G | MAGNESIUM CARBONATE |
| Stress, Stress in Hard Clams from a Polluted | W15-02409 | Magnesium Carbonate: A Recycled Coagulant - |
| Estuary, W73-01975 5C | Log Interpretations in Sandstone Reservoirs, | II, |
| #15-01913 SC | W73-02423 4B | W73-02145 5F |
| LITHOLOGIC LOGS | 113 02123 | What's So Great About MgCO3, |
| Compositional Logging of Air-Drilled Wells, | LOMME VALLEY | W73-02219 5F |
| W73-02377 8B | Study of a Topo-Lithological Transect of the | W 15-02219 |
| 1175 02517 | Eprave-Rochefort Surroundings (Lomme Val- | MAGNESIUM COMPOUNDS |
| LITIGATION | ley, Southeast Belgium) to Delimitate the | Magnesium Bisulfite Recovery Startup, |
| Courts and Water, The Role of the Judicial | Forest Ecological Groups of the Calestienne, | W73-02224 5D |
| Process, | W73-02294 4A | THE RESERVE THE PROPERTY OF THE PERSON OF TH |
| W73-02365 6E | CONTRACTOR OF THE PARTY OF THE | MAGNESIUM HYDROXIDE |
| | LONG TERM DEBTS | Magnesium Carbonate: A Recycled Coagulant |
| LITTLE ELM CREEK (TEX) | The Problems and Issues of Implementing Na- | II, |
| Annual Compilation and Analysis of Hydrolog- | tional Water Legislation at Subnational Levels, | W73-02145 5F |
| ic Data for Little Elm Creek, Trinity River | W73-02242 6E | MAINE |
| Basin, Texas, 1970, | LOUDGLANA | Effect of Animal Wastes Applied to Soils on |
| W73-02324 7C | LOUISIANA | Surface and Ground Water Systems, |
| FITTI P CIOUX (IOWA) | Louisiana Irrigation and Mill Co. V. Pousson | W73-01960 5B |
| LITTLE SIOUX (IOWA) | (Injunctive Relief to Protect and Aqueduct Ser- | |
| Sunrise Subwatershed, Little Sioux Flood | vitude). | Average Water Content of Snowpack in Maine, |
| Prevention Project, Iowa (Draft Environmental | W73-02236 6E | W73-02326 70 |
| Impact Statement). W73-02263 4D | Discon V. Saray, Inc. (Access Rights of Lan- | |
| W73-02263 4D | downers Bordering Navigable Canal). | MAINTENANCE |
| LITTORAL | W73-02237 6E | Maintaining Water Well Yield, |
| The Effect of Water Level Fluctuations on a | W13-02231 0E | W73-02369 8G |
| Littoral Fauna. | Pearl River Basin, Edinburg Dam and Lake, | 141400 |
| W73-02477 5C | Mississippi and Louisiana (Draft Environmen- | MAIZE |
| W15-02411 | tal Impact Statement). | Agrometeorological Conditions and Charac |
| LITTORAL DRIFT | W73-02254 8D | teristics of the Maize Development in the Plant- ing-Sprouting Period, (In Bulgarian), |
| Edge Waves with Current Shear, | | W73-01999 3F |
| W73-02170 2E | LOW FLOW | H /3-01377 |
| | Low-Flow Study of Streams in Albany County, | MAIZE-M |
| LITTORAL VEGATATION | New York, | Changes of Soil Moisture Under Lucerne and |
| The Littoral Vegetation at Lake Mjorn in | W73-02318 7C | Maize Stands Grown for Green Mass (In |
| Western Vastergotland, (In Swedish), | F OWN I AMO | Czech), |
| W73-02104 2H | LOWLANDS | W73-02142 20 |
| | Runoff Coefficients for Areas Between | |

Isochrones (O koeffitsiyentakh yestestvennogo

zaregulirovaniya stoka na mezhizokhronnykh

Annual Streamflow Fluctuations in the Dniester River Basin (Kolebaniya godovogo stoka rek basseyna Dnestra), W73-02335 4A

uchastkakh), W73-02331

5C

SU-32

LLYN TEGID (NORTH WALES)

Littoral Fauna,

LOCAL GOVERNMENTS

W73-02477

ing, W73-02289

The Effect of Water Level Fluctuations on a

Principles and Problems of Municipal Financ-

MANAGEMENT
Manager's Role in the Decision Making
Process,

Standing Crops of Elements and Atomic Ratios in a Small Mammal Community,

MAMMALS

W73-02584

W73-02127

MARINE P Ecologica W73-0202

5A

MARINE P

Radiome Phosphai W73-024

Manage W73-07

With Q W73-02 Irrigationess, W73-02 MANGAR Transit W73-01 Determine Humsis, W73-02 Effect (Cu, h Metabo W73-02 MANOMI A Porta W73-02

W73-02 A Water W73-02: MAPS An Ana Oriente sembly a W73-023 A Water W73-025 MARINAS Hydro-H Puget So W73-024 MARINE Release Macropl W73-021 MARINE A The Wes W73-020 Ecologic W73-020 MARINE I The Adh Substance W73-024 MARINE F DDT Re ton and 7 W73-021

| Management Problems in Flood Plain Areas, | MARKET FAILURE | Optimizing the Operation of Israel's Water |
|--|---|---|
| W73-02288 6F | The Crisis in Shoreline Recreation, | System, |
| | W73-02302 6G | W73-02287 6B |
| Historical Changes of Estuarine Topography | MARKETS | 2 - 1 - 2 - 2 - 11 - 1 - 1 - 2 - 1 |
| With Question Of Future Management Policies, W73-02464 SC | The Framework for Analysis, | Boundary Flow Considerations in the Design of |
| W/3-02464 , 3C | W73-02300 6G | Wells, W73-02394 8B |
| Irrigation Management A Tool for Agribusi- | W/3-42300 | W73-02394 8B |
| ness, | MARKOV PROCESSES | Applications of Some Numerical Models to |
| W73-02546 3F | A Random-Walk Simulation Model of Alluvial | Pacific Northwest Estuaries, |
| | Fan Deposition, | W73-02456 5C |
| ANGANESE | W73-02342 2J | |
| Transition Metals of Impounded Waters, | ***************** | Mathematical Modeling of Estuarine Benthal |
| W73-01953 5B | MARSH THISTLE | Systems, |
| Determination of Manganese, Copper, and Iron | Contribution to the Ecology of Cirsium Pa- | W73-02457 5C |
| in Human Blood by Neutron Activation Analy- | lustre (L.) Scop, | |
| sis, | W73-02279 2I | Mathematical Description of Biological and |
| W73-02018 5A | MARSH VEGETATION | Physical Processes in Heated Streams, |
| | Aquatic and Marsh Vegetation of the Timis- | W73-02468 5C |
| Effect of Dietry Deficiency of Trace Elements | Bega Interfluvial Zone, | 30 1 2 - 10 - 12 1- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| (Cu, Mo, Mn) on Water and Electrolyte | W73-02316 4A | Modeling and Sensitivity Analysis for Planning |
| Metabolism, | | Decisions in Water Resources Expansion, |
| W73-02086 5C | MARYLAND | W73-02541 4A |
| Hart transfer to the second second | Sediment Control, | Water Economics, |
| IANOMETERS | W73-02200 5G | |
| A Portable Airline to Measure Water Level, | | W73-02543 4B |
| W73-02382 7B | Saint Catherine Sound, Maryland (Maintenance | MATHEMATICAL STUDIES |
| IAPPING | Dredging) (Final Environmental Impact State- | A Method of Mathematical Modeling of Com- |
| Field Mapping and Computer Simulation of | ment). | |
| Braided-Stream Networks, | W73-02516 4A | plex Ecological Systems, W73-02032 5B |
| W73-02490 2J | Baltimore Harbor Outer Crossing (Patapsco | W 13-02032 3B |
| 115-02-00 | River Bridge) Baltimore, Maryland (Final En- | Effect of Friction on Wave Shoaling, |
| A Water Use Map of the Great Lakes Basin, | vironmental Impact Statement). | W73-02173 2E |
| W73-02512 2H | W73-02518 8A | W 15-02115 |
| | W13-02510 | Serial-Correlation Structure of Discretized |
| IAPS | MASS WASTING | Streamflow. |
| An Analysis of Forested Watershed Land of | Wisconsin Boulder Flow and Its Geomorphic | W73-02323 2E |
| the Cape Fear River Basin Using a Computer- | Implications, Franklin Mountains, El Paso | |
| Oriented Alphanumeric Map Information As- | County, Texas, | MEASUREMENT |
| sembly and Display System, | W73-02487 2J | Water Quality Measurements with Airborne |
| W73-02358 7C | | Multispectral Scanners, |
| 1 W - V - M - /4 - C V - b - B - !- | MASSACHUSETTS | W73-02182 5A |
| A Water Use Map of the Great Lakes Basin, | Surface Waters of a Small City (Springfield, | |
| W73-02512 2H | Mass), | Neptune Meter Company's New Water Meter |
| ARINAS | W73-01961 6G | Manufacturing Facility. |
| Hydro-Ecological Problems of Marinas in | The West Pelmonth Off Call Date Assilable in | W73-02216 8C |
| Puget Sound, | The West Falmouth Oil Spill. Data Available in | |
| W73-02462 5C | 1971. II. Chemistry, W73-02024 5C | A Portable Airline to Measure Water Level, |
| 77.50.702 | W13-02024 3C | W73-02382 7B |
| MARINE ALGAE | Bucks Harbor, Machiasport, Maine (Final En- | |
| Release of Dissolved Organic Matter by Marine | vironmental Impact Statement). | Oxidation-Reduction Potentials, Oxygen Con- |
| Macrophytes, | W73-02234 8A | centration and Oxygen Uptake of Profundal |
| W73-02100 5C | | Sediments in a Eutrophic Lake, |
| | Christoffels V. Alton Properties, Inc. (Private | W73-02451 5C |
| MARINE ANIMALS | Suits Barred Under State Statute Pertaining to | THE RESIDENCE AND ADDRESS OF A STATE OF THE PARTY OF THE |
| The West Falmouth Oil Spill. I. Biology, | Filling in of Lakes). | MEASUREMENT VARIABILITY |
| W73-02023 5C | W73-02243 6E | Assessment of Turbidity, Color, and Odor in |
| Realizate of Officers Construction | Water Ovality Improvement in Destan III. 1 | Water, |
| Ecological Effects of Offshore Construction, | Water Quality Improvement in Boston Harbor, | W73-01971 5G |
| W73-02029 5C | W73-02303 6G | MECHANICAL EFFICIENCY |
| AARINE BIOLOGY | MATERIALS TESTING | |
| The Adhesive Properties of Chlorella Vulgaris, | Fundamentals of Rock Mechanics, | Relation of Screen Design to the Design of |
| and the Enhancement of This Adhesion by | W73-02372 8E | Mechanically Efficient Wells, W73-02410 8B |
| Substances Found in Ambient Sea Water, | | W 13-02-10 8B |
| W73-02470 5C | MATEWAN (WEST VIRGINIA) | MECHANICAL ENGINEERING |
| | Local Protection and Floodproofing Project, | Pump Application Engineering, |
| AARINE FISH | Matewan, West Virginia, Tug Fork of Big | |
| DDT Residues in Coastal Marine Phytoplank- | Sandy River (Draft Environmental Impact | W73-02414 8C |
| ton and Their Transfer in Pelagic Food Chains, | Statement). | MECHANICAL EQUIPMENT |
| W73-02105 5C | W73-01991 8A | Some Results of Dri Investigations-Rock |
| | NATIONAL MICH. MODERN | Failure in Percussion. |
| MARINE PHOSPHORITES | MATHEMATICAL MODELS | W73-02406 8E |
| Radiometric Evidence for Recent Formation of | A Method of Mathematical Modeling of Com- | |
| Phosphatic Nodules in Marine Shelf Sediments, | plex Ecological Systems, | MEDITERRANEAN SEA |
| W73-02497 2J | W73-02032 5B | Morphology and Recent Sediments of the |
| AARINE PLANTS | A Water Quality Model for a Conjunctive Sur- | Western Alboran Basin in the Mediterranean |
| Ecological Effects of Offshore Construction, | face-Groundwater System: An Overview, | Sea, |
| W73-02029 5C | W73-02178 5B | W73-02494 2J |
| | | |

MEERUT (UTTAR PRADESH

| MEERUT (UTTAR PRADESH | Analysis of Chlorinated Hydrocarbon Pesti- | MINERAL WATER |
|--|--|--|
| Water Table Fluctuations in the Meerut Dis- | cides in Waters and Wastewaters, | Effect of Donetsk Mineral Water on the Clini- |
| trict, Uttar Pradesh, India, | W73-02313 5A | cal Course of Chronic Cholangiohepatitis, (In |
| | #15-02515 | Russian). |
| W73-02044 4B | METHODS MANUAL | W73-02002 5C |
| MEIGS COUNTY (OHIO) | Analysis of Chlorinated Hydrocarbon Pesti- | W 73-02002 |
| Leading Creek Conservancy District (Final En- | cides in Waters and Wastewaters, | MINERALIZED WATER |
| | W73-02313 5A | Studies of the Effect of Desalinated Drinking |
| vironmental Impact Statement). | W13-02313 | |
| W73-02267 5F | MEXICAN WATER TREATY | Water on the Functional State of the Organism, |
| ACCUPATE OF ORDAY | The Mexican Water Treaty and its Relationship | W73-02091 5F |
| MELBOURNE (FLORIDA) | | THE PARTY OF THE P |
| What's So Great About MgCO3, | to Colorado River Water Supplies, | MINERALOGY |
| W73-02219 5F | W73-02529 5G | A Contribution to the Sedimentary Petrological |
| | APPLIED BY BROOK AND AN | Description of the Maas Deposits in Southern |
| MELT WATER | MIAMI HARBOR (FLA) | Limburg (The Netherlands), |
| Form of the Relation Between Melt-Water | Miami Harbor, Florida, Navigation (Final En- | W73-02153 2J |
| Losses and Some Hydrologic Characteristics | vironmental Impact Statement). | |
| (O vozmozhnoy forme zavisimosti poter' ta- | W73-02517 8A | MINING |
| lykh vod ot nekotorykh obuslovlivayushchikh | And the second s | Analysis of Actions of the United Nations |
| faktorov), | MICHIGAN | Seabeds Committee, |
| W73-02332 2E | Control of Nitrate Contamination of Ground | W73-02527 6E |
| | Water Associated with Land Disposal of Mu- | W13-02521 |
| Meltwater Gaging Program Project No 1, Ap- | nicipal Sewage, | MINNESOTA |
| proach Roads, Tuto Area, Greenland. | W73-02111 5B | |
| W73-02486 2C | I/MIC NO. | Minnesota Pollution Control Agency V. Hat- |
| 20 | River Rouge Flood Control Project, Wayne | field (Public Expenditures for Water Pollution |
| MERCURY | County, Michigan (Final Environmental Impact | Abatement as a Legitimate Public Purpose). |
| Automated Separations in Routine Activation | Statement). | W73-02240 6E |
| | W73-02270 4A | |
| Analysis of Mercury, W73-02015 5A | 47 | Taxonomy of North Shore Periphyton, Lake |
| W73-02015 5A | MICRO FUNGI | Superior, Castle Danger Studies 1970-1971, |
| 0-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1 | Environments and the Distribution of | W73-02555 . 5C |
| Contents and Behaviour of Mercury as Com- | | |
| pared with Other Heavy Metals in Sediments | Microfungi in a Hawaiian Mangrove Swamp, | Pollution and the Ecology of Nearshore |
| from the Rivers Rhine and Ems, | W73-02189 2I | Periphyton of Lake Superior: The Effects of |
| W73-02158 5B | | Calefaction on Periphyton, |
| | MICROBIAL DEGRADATION | W73-02556 5C |
| METABOLISM | Microbial Degradation of Pesticides in Aqueous | W 15-02550 5C |
| The Ambient Environment of Lichens as a | Solutions, | MISSISSIPPI |
| Function of Exterior Atmospheric Conditions | W73-02534 5B | |
| Existing in the Locality, | | Pearl River Basin, Edinburg Dam and Lake, |
| W73-02290 2I | MICROBIOLOGICAL CORROSION | Mississippi and Louisiana (Draft Environmen- |
| 1175-02250 | Microbiological Corrosion of Iron and Steel, | tal Impact Statement). |
| METAL CHELATES | W73-02403 8G | W73-02254 8D |
| Physical Chemistry of Extraction Processes, | 1175-02103 | |
| | MICROCOULOMETRIC TITRATION | MISSOURI |
| W73-02014 1B | Measures of Organic Pollutants in Wastewater | Spain V. Cape Girardeau (Surface Water |
| METALS | Treatment Plant Operations, | Damage Caused by Street Resurfacing). |
| | W73-02334 5D | W73-02241 6E |
| Transition Metals of Impounded Waters, | W 13-02334 5D | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| W73-01953 5B | MICROORGANISMS | Niangua Hydro Project (Draft Environmental |
| D | | Impact Statement). |
| Determination of Trace Metal Pollutants in | Kinetics of Biologically Mediated Aerobic Ox- | W73-02515 8C |
| Water Resources and Sediments, | idation of Organic Compounds in Receiving | 117-02515 |
| W73-01958 5A | Waters and in Waste Treatment, | MISSOURI RIVER |
| | W73-02450 5C | |
| METAMORPHIC ROCKS | The Part of the Pa | Power Spectral Analysis of Water Temperature |
| Studies of Saprolite and Its Relation to the | MICROSTRAINERS | Fluctuations, |
| Migration and Occurrence of Groundwater in | Kenosha Increases Plant Capacity with Micros- | W73-02180 5B |
| Crystalline Rocks, | trainers, | A HOTE PROPERTY AND A STATE OF THE STATE OF |
| W73-01955 2F | W73-02426 5F | MIST IRRIGATION |
| No. of the last of | | Influence of Mist Irrigation on Growth, Yields, |
| METHODOLOGY | MICROWAVE EMISSION | and Quality of Potatoes and Snap Beans, |
| A Simple Apparatus for Measuring Activity | Microwave Emission Characteristics of Oil | W73-01966 3F |
| Patterns of Fishes, | Slicks, | A MARK TO A SECURE OF THE PROPERTY OF |
| W73-01977 5A | W73-02162 5A | A Study of the Effects of Mist Irrigation on the |
| The state of the s | THE TEN | Potato (Solanum tuberosum L.) and the Snap |
| Automated Separations in Routine Activation | MICROWAVES | Bean (Phaseolus vulgaris L.), |
| Analysis of Mercury, | Microwave Emission Characteristics of Oil | W73-01967 3F |
| | Slicks, | 3F |
| W73-02015 5A | W73-02162 5A | The Influence of Mist Irrigation on the Potato |
| Techniques for Sampling Benthic Organisms, | | IV. Tuber Quality Factors, |
| W73-02019 7B | MIGRATION (FISH) | W73-01968 3F |
| # 15-02019 /B | | 31 |
| | Age Growth and Downstream Migration of | |
| A Method of Mathematical Madelina of Com- | Age, Growth, and Downstream Migration of | The Influence of a Short Period of Evaporative |
| A Method of Mathematical Modeling of Com- | Juvenile Rainbow Trout (Salmo gairdneri) in a | The Influence of a Short Period of Evaporative |
| plex Ecological Systems, | Juvenile Rainbow Trout (Salmo gairdneri) in a Lake Michigan Tributary, | Cooling on the Distribution of 14C in Potato |
| | Juvenile Rainbow Trout (Salmo gairdneri) in a | Cooling on the Distribution of 14C in Potato Plants, |
| plex Ecological Systems, W73-02032 5B | Juvenile Rainbow Trout (Salmo gairdneri) in a Lake Michigan Tributary, W73-02574 | Cooling on the Distribution of 14C in Potato |
| plex Ecological Systems, W73-02032 5B Advances in Analytical Chemistry and Instru- | Juvenile Rainbow Trout (Salmo gairdneri) in a Lake Michigan Tributary, W73-02574 8I MILWAUKEE RIVER (WIS) | Cooling on the Distribution of 14C in Potato Plants, W73-01969 3F |
| plex Ecological Systems, W73-02032 5B Advances in Analytical Chemistry and Instru- mentation. Volume 9 - Spectrochemical | Juvenile Rainbow Trout (Salmo gairdneri) in a Lake Michigan Tributary, W73-02574 8I MILWAUKEE RIVER (WIS) Chlorobiphenyls (PCBs) in the Milwaukee | Cooling on the Distribution of 14C in Potato Plants, W73-01969 3F The Influence of Mist Irrigation on the Potato: |
| plex Ecological Systems, W73-02032 5B Advances in Analytical Chemistry and Instru- | Juvenile Rainbow Trout (Salmo gairdneri) in a Lake Michigan Tributary, W73-02574 8I MILWAUKEE RIVER (WIS) | Cooling on the Distribution of 14C in Potato Plants, W73-01969 3F |

| MIXING-I |
|----------|
| A Unifi |
| Mixing- |
| W73-023 |
| MODEL S |

| ODEL S |
|-----------|
| A Progra |
| Watersh |
| Geomor |
| tributing |
| W73-019 |
| |
| Salt Poll |

| | Sal | t. | Po | n |
|---|-----|-----|-----|----|
| 1 | N7 | 13. | -02 | 21 |
| | | | | |
| | | | da | |
| | | | al | |
| V | ٧7 | 3. | -02 | 2 |

| | Un | |
|----|------|-----|
| W | 73-0 | 123 |
| e. | mio1 | C |

| | | nfl 23 |
|---------|--|-----------|
| A Fa | | |

| W | 73 | -0 | 2 | 3 |
|----|----|----|----|---|
| Th | e | P | ot | e |
| Es | | | | |
| W | 73 | -0 | 2 | ļ |

| 1 | | | | | | |
|---|---|---|---|----|---|---|
| - | H | y | đ | re | d | 0 |
| 1 | W | 7 | 3 | -0 | 2 | 4 |

| The Influence of Mist Irrigation on the Potato: III. Nutrient Content of Leaves, W73-02442 | Effect of Temperature on Pressure Head-Water Content Relationship and Conductivity of Two Soils. | MONTE CARLO SIMULATION A Random-Walk Simulation Model of Alluvial |
|--|--|---|
| W/3-02442 3F | W73-02339 2G | Fan Deposition, W73-02342 21 |
| MIXED INTEGER PROGRAMMING | W13-02339 2G | W73-02342 2J |
| A Mixed Integer Programming Approach to | MOISTURE STRESSES | MONTEREY BAY (CALIF) |
| Planning Multiple Water Sources for Municipal Water Supply, | The Influence of Mist Irrigation on the Potato: II. Growth and Development, | Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, |
| W73-02540 6A | W73-02441 3F | W73-02027 5A |
| MIXERS | MOISTURE TENSION | MARKALA AND A COMPANY |
| Artificial Destratification in Reservoirs. | The Response of Root and Shoot Growth to | MORPHOLOGICAL STUDIES |
| W73-02138 5G | Decreases in Soil Water Potential, W73-02558 21 | Ecological and Geomorphological Types of Flood Plain and the Vegetative Structure of |
| MIXING-LENGTH THEORY | W 13-02336 | River Valleys of the Mid-Volga Basin (In Rus- |
| A Unified View of the Law of the Wall Using | MOISTURES STRESSES | sian), |
| Mixing-Length Theory, W73-02306 8B | Influence of Mist Irrigation on Growth, Yields, and Quality of Potatoes and Snap Beans, | W73-02276 4A |
| W/3-02300 | W73-01966 3F | MOUNTAIN GRASSLANDS |
| MODEL STUDIES | W/3-01900 SF | Weather Variations on a Mountain Grassland in |
| A Program for Estimating Runoff from Indiana | MOLDAVIA | Southwestern Montana, |
| Watersheds, Part III Analysis of | Hydrologic Investigations and Flow Computa- | W73-02568 2B |
| Geomorphologic Data and a Dynamic Con- | tions (Gidrologicheskiye issledovaniya i | MT, WASHINGTON |
| tributing Area Model for Runoff Estimation, | raschety stoka). | Recent Climatic Change and Development of |
| W73-01952 2A | W73-02330 4A | the Bristlecone Pine (P. Longaeva Bailey) |
| Salt Pollution of Ground Water, | Storm Runoff Coefficients for Rivers of the | Krummholz Zone, Mt. Washington, Nevada, |
| W73-02113 5B | Ukraine and Moldavia (Koeffitsiyenty stoka | W73-02169 4A |
| Simulation of the Mean Performance of Mu- | dozhdevykh pavodkov na rekakh Ukrainy i Moldavii), | MUD CAKE |
| nicipal Waste Treatment Plants, | W73-02333 4A | Development Work is Essential. |
| W73-02212 5D | W15-02333 | W73-02110 8B |
| A Particular Service London St. Comment of the | Study of the Thermal Regime of Rivers (Ob | |
| A Unified View of the Law of the Wall Using | izuchenii termicheskogo rezhima rek), | M"D INVASION |
| Mixing-Length Theory, | W73-02336 4A | .'iltrate Invasion in Highly Permeable Sands, |
| W73-02306 8B | MOLLUSCICIDES | W73-02422 8B |
| Serial-Correlation Structure of Discretized | The Molluscicide Action of Thiol Reagents (Die | MUD PROPERTIES |
| Streamflow, | Molluscizide Wirkung Von Thiol-Reagentien), | Carrying Capacity of Drilling Muds, |
| W73-02323 2E | W73-02275 5C | W73-02379 8B |
| A Warden Will Glandelle Madel of Alleria | | |
| A Random-Walk Simulation Model of Alluvial Fan Deposition, | MOLLUSKS | MULTIPLE ELECTRODE LOGGING |
| W73-02342 2J | The Molluscicide Action of Thiol Reagents (Die | Electrical Well Logging Fundamentals, W73-02392 8B |
| Made Treatment were the attended | Molluscizide Wirkung Von Thiol-Reagentien), W73-02275 5C | W73-02392 8B |
| The Potential of Physical Models to Investigate | 117 02273 | MULTIPLE-PURPOSE PROJECTS |
| Estuarine Water Quality Problems, W73-02455 5C | MOLYBDENUM Effect of Dietry Deficiency of Trace Elements | Ririe Dam and Lake, Willow Creek, Idaho (Draft Environmental Impact Statement). |
| 4-V-4 0 1 1 1 1 1 1 1 1 1 1 1 1 1 | (Cu, Mo, Mn) on Water and Electrolyte | W73-01988 8D |
| Applications of Some Numerical Models to | Metabolism, | |
| Pacific Northwest Estuaries, W73-02456 5C | W73-02086 5C | What Price Water, |
| W13-02436 | MONITORING | W73-02284 6B |
| Winter Circulation in Lake Ontario, | Development of a Tape Transport Bacterial De- | Watershed Project Evaluation Involving Multi- |
| W73-02509 2H | tection System; Final Report, | ple Social Objectives, |
| Development of Managinal Madala of Lake | W73-02012 5A | W73-02348 6B |
| Development of Numerical Models of Lake Ontario. | | |
| W73-02511 2H | Optical Signatures of the Near-Shore Waters of | MULTIPLE-PURPOSE RESERVOIRS |
| 1170 02011 | Southern Monterey Bay, W73-02027 5A | Optimization of Water Resources Develop- |
| Hydrologic Modeling, | W13-02021 | ment: Optimization of Capacity Specifications |
| W73-02547 2A | Monitoring New York's Water Automatically, | for Components of Regional, Complex In- |
| Modeling and Analysis of Washout in Tower | W73-02135 5G | tegrated, Multipurpose Water Resources Systems, |
| Fermentation Processes. | Physical Chamical Colds & Martin As Co. | W73-01970 6A |
| W73-02554 5D | Physical-Chemical Crisis IndicatorsAre There | |
| | Any, W73-02150 5A | Lost Creek Lake Project, Rogue River, Oregon |
| MODEL WATER CODE | 1175 02150 | (Final Environmental Impact Statement). |
| Administering State Water Resources: The | Petroleum Tanker Pollution Monitoring Unit, | W73-01989 8D |
| Need for Long Range Planning, | W73-02194 5A | Whiteoak Dam and Reservoir, Whiteoak Creek |
| W73-01979 6E | An Automated System for Determining | Basin, Ohio (Draft Environmental Impact |
| MOHAWK POINT (ONTARIO) | Estuarine Bathymetry, | Statement). |
| Lake Erie Nearshore Sediments-Fort Erie to | W73-02317 7B | W73-01990 8A |
| Mohawk Point, Ontario, | | Withhead I she Pall Court Paris I think the |
| W73-02504 2H | MONTANA | Highland Lake Fall Creek Basin, Indiana (Draft |
| MOISTURE CONTENT | A Source Study of the Suspended Solids in the | Environmental Impact Statement). W73-02253 8D |
| Rotary Drilling and Coring in Permafrost: Part | Gallatin River, W73-02559 5B | W 13-02233 8D |
| III, Deep Core Drilling, Core Analysis and | W15-0253 | Pearl River Basin, Edinburg Dam and Lake, |
| Bore Hole Thermometry at Cape Thompson, | Weather Variations on a Mountain Grassland in | Mississippi and Louisiana (Draft Environmen- |
| Alaska, | Southwestern Montana, | tal Impact Statement). |
| W73-02312 8B | W73-02568 2B | W73-02254 8D |

MULTIPLE-PURPOSE RESERVOIRS

| Camp Ground Lake, Salt River Basin, Ken- tucky (Draft Environmental Impact Statement). | Hawaii Regional Inventory of the National Shoreline Study. | NEUTRON ACTIVATION ANALYSIS Automated Separations in Routine Activation |
|---|--|--|
| W73-02269 8A | W73-02321 8 | |
| Clinchfield Dam and Reservoir, Broad River Basin, North Carolina and South Carolina | NATURAL GAS The World's Deepest Cable Tool Well, | Determination of Manganese, Copper, and Iron |
| (Draft Environmental Impact Statement). W73-02524 8D | W73-02388 8 | |
| MULTISPECTRAL SCANNERS | Glacial-Drift Gas in Illinois, W73-02391 8 | W73-02018 SA |
| Water Quality Measurements with Airborne Multispectral Scanners, | NATURAL RESOURCES | Neutron Activation Analysis of WaterA |
| W73-02182 5A | Repair and Protect Our Natural Environment, | Review, W73-02166 SA |
| MUNICIPAL BONDS | NAVIGABLE WATERS | NEUTRON DETECTION |
| Principles and Problems of Municipal Financ- ing, | Discon V. Saray, Inc. (Access Rights of Lar | The Sidewall Epithermal Neutron Porosity |
| W73-02289 6C | downers Bordering Navigable Canal). W73-02237 | Log, E W73-02396 8G |
| MUNICIPAL REFUSE | Winds | 1 TO |
| Closing the Gap in Waste Management, W73-02215 5D | Pigorsh V. Fahner (Exclusive Use of Private Owned Lake). | NEVADA Recent Climatic Change and Development of |
| | | E the Bristlecone Pine (P. Longaeva Bailey) |
| MUNICIPAL WASTES The Effects of Sewer Surcharges on the Level | Dow Chemical Co. V. Dixie Carriers, In | Krummholz Zone, Mt. Washington, Nevada, W73-02169 4A |
| of Industrial Wastes and the Use of Water by | (Private Canal Subject to Regulation Under Rivers and Harbors Act). | |
| Industry, W73-02115 5G | | E Testing for and The Development of Ground |
| User Charges as a Means for Pollution Control: | NAVIGATION | Water Supplies, W73-02412 4B |
| The Case of Sewer Surcharges, | Maintenance Dredging, Chatham (Stage) Ha | P. |
| W73-02359 5G | bor, Massachusetts (Draft Environmental In pact Statement). | NEW HAMPSHIRE The Influence of the New England Wetland on |
| Sewer Surcharges and Their Effect on Water, | | A Water Quantity and Quality, |
| W73-02360 5G | Marine Aids to Navigation - Selection ar | W73.02116 2D |
| The Industrial Demand for Water and Waste | Design, | Newington Generating Station Unit No. 1, |
| Treatment in Selected U.S. Cities Which are Levying Surcharges, | | C Newington, New Hampshire (Draft Environ- mental Impact Statement). |
| W73-02361 5G | NAVIGATION AIDS Marine Aids to Navigation - Selection ar | W222 00614 0C |
| MUNICIPAL WATER | Design, | NEW HODE DIVED (NO |
| Inventory of Water Diversions and Rate Struc- tures for Cities, Towns, and Villages in New | | A Survey of the Benthic Macroinvertebrate |
| Mexico, W73-01963 6C | NEAT CEMENTS Well Grouting and Well Protection, | Populations in the New Hope and Lower Haw Rivers, |
| *************************************** | | F W73-02355 5B |
| Control of Nitrate Contamination of Ground Water Associated with Land Disposal of Mu- | NEBRASKA | Heavy Metal Analyses of Freshwater Macroin- |
| nicipal Sewage, | Thermal, Turbidity, and pH Conditions of the | |
| W73-02111 5B | Upper White River: Sioux and Dawes Cou- ties, Nebraska, | n- Hope Rivers, W73-02356 SA |
| Gregory V. City of New York (Non-Resident | | C NEW JERSEY |
| Riparian Landowner's for Upstream Diversion by Municipality). | The Impact of Reduced Light Penetration on | |
| W73-02239 6E | Eutrophic Farm Pond, | the August 27-28, 1971, New Jersey Flood, |
| Regional Management of Water Supply and | W73-02349 5 | C W73-02174 2A |
| Wastewater Disposal Facilities, W73-02354 6B | NETHERLANDS A Contribution to the Sedimentary Petrologic | Nonlinear Optimal Control Theory Applied to a al Distributed Feed Biochemical River Reactor |
| | Description of the Maas Deposits in Souther | |
| NATIONAL ENVIRONMENTAL POLICY ACT Sierta Club V. Froehlke (Judicial Review of | Limburg (The Netherlands), W73-02153 | Restraints, W73-02352 5G |
| Environmental Impact Statement). W73-02238 6E | Contents and Behaviour of Mercury as Con | |
| NATIONAL ENVIRONMENTAL POLICY ACT | pared with Other Heavy Metals in Sedimen from the Rivers Rhine and Ems, | W73-02448 SC |
| OF 1969 Proposed Principles and Standards for Planning | 10.49 (8-850) | B NEW MEXICO |
| Water and Related Land Resources. | Some Sedimentological Aspects of the Fl | Inventory of Water Diversions and Rate Struc- tures for Cities, Towns, and Villages in New |
| W73-02231 6E | vioglacial Outwash Plain Near Soesterbe (The Netherlands), | Mexico, |
| NATIONAL REACTOR TESTING STATION (IDAHO) | | 2J W73-01963 6C |
| Hydrochemical Study of the National Reactor | NEUTRON ABSORPTION | Eagle-Tumbleweed Draw Watershed, New |
| Testing Station, Idaho, W73-02484 5B | Neutron Activation Analysis of Water- Review, | A Mexico (Draft Environmental Impact Statement). |
| | | A W73-01985 4D |
| NATIONAL SHORELINE STUDY National Shoreline Study, Regional Inventory | The Sidewall Epithermal Neutron Porosi | ty Soil Associations and Land Classification for |
| Report, North Atlantic Region. | Log, | Irrigation, Socorro County, G W73-02117 3F |
| | | |

NEW YOR Hempste ject (Dra W73-019

W73-021 Oneida S W73-021

In Re Jo risdiction Conserva Chemical W73-022 Hamlin I Erosion roe Cour Impact S W73-022

Low-Flor New Yor W73-023 The An Water Tr W73-024

A Summ New Yor W73-024 NEW ZEAL

Direct C the Bay o NEWHALE

Newhale Environa W73-025 NEWINGT Newingto Newingto mental In W73-025

NIAGARA Hydrogeo Drainage Ontario, W73-0250

NIAGARA: History of and The I W73-0249 NICHEL

Saving Discharge W73-0222

NICKEL The Dete Nickel in W73-0207

NITRATE I The Nitra W73-0247

NITRATES Control of Water As nicipal Se W73-0211

| NEW YORK Hempstead Harbor, New York Navigation Pro- | Wastewater Treatment by Ion Exchange, W73-02202 5D | Sandy River (Draft Environmental Impact Statement). |
|---|--|---|
| ject (Draft Environmental Impact Statement). | 35 | W73-01991 8A |
| W73-01995 8A | Studies on Reverse Osmosis for Water Pollu- | |
| | tion Control, | NORTH ATLANTIC REGION |
| Monitoring New York's Water Automatically, | W73-02225 5D | National Shoreline Study, Regional Inventory |
| W73-02135 5G | The Nitrate Reductase of Chlorella, | Report, North Atlantic Region. |
| Oneida Shows the Way To Go, | W73-02476 5C | W73-02186 8B |
| W73-02196 5D | W.5-02-10 | NORTH CAROLINA |
| Assistant of the control of the boundary of | NITRIFICATION | Military Ocean Terminal, Sunny Point, North |
| In Re Johnson Orchards and Farms, Inc. (Ju- | What's it all About. Algae, | Carolina (Draft Environmental Impact State- |
| risdiction of Department of Environmental | W73-02187 5G | ment). |
| Conservation over Accidental Discharge of Chemicals in State Waterway). | Groundwater Recharge and Quality Transfor- | W73-01981 4A |
| W73-02246 6E | mations During Initiation of a New Sewage Sta- | Proposed Reclassifications of Certain Waters in |
| W13-02240 | bilization Pond (and Management), | the Cape Fear, Lumber, and Yadkin-Pee Dee |
| Hamlin Beach State Park Cooperative Beach | W73-02438 5B | River Basins to be Considered at a Public Hear- |
| Erosion Control Project, Lake Ontario, Mon- | | ing to be Held on November 2, 1972, in |
| roe County, New York (Draft Environmental | NITROGEN | Southern Pines, North Carolina. |
| Impact Statement). | Effect of Animal Wastes Applied to Soils on | W73-01983 5G |
| W73-02261 8A | Surface and Ground Water Systems, W73-01960 5B | Pollution Control Shines in Chrome Chemicals |
| Low-Flow Study of Streams in Albany County, | W73-01960 5B | Plant. |
| New York. | Nutrient Removal by Waterhyacinth, | W73-02282 5G |
| W73-02318 7C | W73-02122 5G | 117-02202 |
| | | A Survey of the Benthic Macroinvertebrate |
| The Analytical Control of Anti-Corrosion | Contribution to the Study of Nitrogen Leaching | Populations in the New Hope and Lower Haw |
| Water Treatment, | in a Sandy Soil ('Dior') in Senegal, | Rivers, |
| W73-02411 5F | W73-02161 5G | W73-02355 5B |
| A Summary of Peak Stages and Discharges in | What's it all About. Algae, | Heavy Metal Analyses of Freshwater Macroin- |
| New York for the Flood of June 1972, | W73-02187 5G | vertebrates from the Lower Haw and New |
| W73-02492 2E | The second secon | Hope Rivers, |
| | Kinetics of Algal Biomass Production Systems | W73-02356 5A |
| NEW ZEALAND Direct Observations of Columnar Scattering | with Respect to Intensity and Nitrogen Concen- | Evaluation of Selected Aspects of Communica- |
| Associated with Geothermal Gas Bubbling in | tration, W73-02218 5C | tion of Water Resources Research Information |
| the Bay of Plenty, New Zealand, | W 13-02210 3C | Among University Researchers and Users, |
| W73-02052 2L | Analysis of Residual Total Nitrogen in Waste- | W73-02357 6B |
| | waters, | |
| NEWHALEM CREEK (WASH) | W73-02345 5A | An Analysis of Forested Watershed Land of |
| Newhalem Creek Project, Washington (Draft | Constitutes Backers and Quality Transfer | the Cape Fear River Basin Using a Computer- |
| Environmental Impact Statement). W73-02522 8C | Groundwater Recharge and Quality Transfor- mations During Initiation and Management of a | Oriented Alphanumeric Map Information As- sembly and Display System, |
| W/3-02322 8C | New Stabilization Lagoon, | W73-02358 7C |
| NEWINGTON (NEW HAMPSHIRE) | W73-02439 5B | W 13-02336 |
| Newington Generating Station Unit No. 1, | | Clinchfield Dam and Reservoir, Broad River |
| Newington, New Hampshire (Draft Environ- | NITROGEN COMPOUNDS | Basin, North Carolina and South Carolina |
| mental Impact Statement). | The Effects of Divalent Metal Ions on the | (Draft Environmental Impact Statement). |
| W73-02514 8C | Micellar Properties of Sodium Dodecyl Sulfate, | W73-02524 8D |
| NIAGARA PENINSULA (CANADA) | W73-02557 2K | NORTH DAKOTA |
| Hydrogeology of the Forty Mile Creek | NITROGEN FIXATION | The Forest Overstory Vegetation on the Mis- |
| Drainage Basin on the South Shore of Lake | Algal Nitrogen Fixation in Temperate Regions, | souri River Floodplain in North Dakota, |
| Ontario, | W73-02471 5C | W73-02185 4A |
| W73-02503 2H | | NORTH OCCUPE BRIEF (CA) |
| WIGIBI BRUPS | Nitrogen Fixation in Lakes, | NORTH OCONEE RIVER (GA) Curry Creek Reservoir, North Oconee River, |
| NIAGARA RIVER History of Water Level Gauges, LAKE Erie | W73-02472 5C | Georgia (Draft Environmental Impact State- |
| and The Ningara River. | Algal Nitrogen Fixation in the Tropics, | ment). |
| W73-02493 7C | W73-02473 5C | W73-02523 8A |
| 30.000 | | |
| NICHEL | Relation Between Anaerobic ATP Synthesis | NORTH SEA |
| Saving the Dragout Keeps Plater Within | from Pyruvate and Nitrogen Fixation in | The Frequency Distribution of the Current |
| Discharge Limits, W73-02227 5D | Azotobacter vinelandii, W73-02475 5C | Speed at the Netherlands Lightvessels and Its Possible Influence on the Composition of Sedi- |
| W13-02221 3D | W15-02415 | ments in the Southern North Sea. |
| NICKEL | NO. 2 FUEL OIL | W73-02155 2J |
| The Determination of Traces of Cobalt and of | The West Falmouth Oil Spill. Data Available in | |
| Nickel in Mineral Waters, | 1971. II. Chemistry, | NORTHEAST U.S. |
| W73-02071 2K | W73-02024 5C | National Shoreline Study, Regional Inventory |
| NITRATE REDUCTASE | NOMOGRAPH | Report, North Atlantic Region. W73-02186 8B |
| The Nitrate Reductase of Chlorella, | A Nomograph Based on Kinematic Wave | W 13-02100 8B |
| W73-02476 5C | Theory for Determining Time of Concentration | NORWAY |
| | for Overland Flow, | Bedforms of the Tana River, Norway, |
| NITRATES | W73-02322 8B | W73-02047 2C |
| Control of Nitrate Contamination of Ground | MONOMPHOWED AT A PROPERTY METERS | NOZZLE DESIGN |
| Water Associated with Land Disposal of Mu- | NONSTRUCTURAL ALTERNATIVES Local Protection and Floodproofing Project, | Concentration of Brines by Spray Evaporation, |
| nicipal Sewage, W73-02111 5B | Matewan, West Virginia, Tug Fork of Big | W73-02081 5E |
| 70 | mental inter ingenia, and a cit or and | 100.7 |

OPEN C Maint bor, I pact S W73-C

OPERA Pollut W73-0

Cost o W73-0

OPERA? Design Treatn W73-0

OPERAT Proces Lakes W73-0

Water W73-0

OPTICA Optica Southe W73-0

OPTIMA Nonlin Distrib

with D Restrai

OPTIMIZ Econor Manag W73-01

Optimi ment: for Co tegrate System W73-01

Nonline Distribute with D Restrai W73-02

How to W73-02

A Mix Plannin Water S W73-02

Modelin Activate W73-02 OPTIMU! Further Desaltin Firm Yi W73-02

Optimus Desaltir Water F W73-020

Watersh ple Soci W73-023

NUCLEAR POWERPLANTS

| NUCLEAR POWERPLANTS Thermal Effects of Power Plants on Lakes, | OCEAN WAVES Edge Waves with Current Shear, | Electrical Well Logging Fundamentals, W73-02392 8B |
|--|--|--|
| W73-02068 2H | W73-02170 2E | OIL POLLUTION |
| NUCLEAR REACTORS Hydrochemical Study of the National Reactor | OCEANOGRAPHY Recent Federal Policies Affecting Marine | The West Falmouth Oil Spill. I. Biology, W73-02023 5C |
| Testing Station, Idaho, W73-02484 5B | Science and Engineering Development, W73-02466 5C | Petroleum Tanker Pollution Monitoring Unit, W73-02194 5A |
| NUCLEAR WASTES | OCEANS | *************************************** |
| Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear- Powered Ships and Their Support Facilities, | Sound Attenuation in Marine Sediments, W73-02467 2J | Toxicological Studies on Emulsions for the Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die |
| W73-01982 5B | The Need to Control Ocean Dumping, W73-02526 6E | Bekaempfung Von Oelverschmutzungen), W73-02281 5C |
| NUCLEATION | *************************************** | |
| Mobilities of Injected Ions in Liquid Water, W73-02114 5A | ODONATA The Ponds of the Soignes Forest, | Oil Pollution Act Amendments of 1972 (H.R. 15627), |
| NUISANCE (LEGAL ASPECTS) | W73-02593 4A | W73-02528 6E |
| Spain V. Cape Girardeau (Surface Water | ODOR | OIL POLLUTION ACT |
| Damage Caused by Street Resurfacing). | Assessment of Turbidity, Color, and Odor in | Oil Pollution Act Amendments of 1972 (H.R. |
| W73-02241 6E | Water, W73-01971 5G | 15627), |
| NUMERICAL ANALYSIS | | W73-02528 6E |
| Note on the Finite Element Solution of the Dif- fusion-Convection Equation, | Artificial Destratification in Reservoirs. W73-02138 5G | OIL SLICKS |
| W73-02338 2E | | Microwave Emission Characteristics of Oil Slicks. |
| Finite Element Analysis of Flow Toward Arte- | OFFSHORE CONSTRUCTION Ecological Effects of Offshore Construction, | W73-02162 5A |
| sian Well, | W73-02029 5C | |
| W73-02340 2F | | Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on |
| Development of Numerical Models of Lake | OFFSHORE PLATFORMS Offshore Siting of Electric Power Plants, | Water. |
| Ontario, | W73-02301 6G | W73-02183 5A |
| W73-02511 2H | AMERICAN OFFICENCE | OIL SPILLS |
| NUTRIENT REMOVAL | OFFSHORE STRUCTURES Offshore Siting of Electric Power Plants, | The West Falmouth Oil Spill. I. Biology, |
| Chemical and Sediment Movement from | W73-02301 6G | W73-02023 5C |
| Agricultural Land into Lake Erie, | omo. | The West February Oil Smill Date Assellable in |
| W73-01957 5B | OHIO Chemical and Sediment Movement from | The West Falmouth Oil Spill. Data Available in 1971. II. Chemistry, |
| Nutrient Removal by Waterhyacinth, | Agricultural Land into Lake Erie, | W73-02024 5C |
| W73-02122 5G | W73-01957 5B | Microwave Emission Characteristics of Oil |
| NUTRIENTS | Determination of Trace Metal Pollutants in | Slicks, |
| Nutrient Removal by Waterhyacinth, W73-02122 5G | Water Resources and Sediments, W73-01958 5A | W73-02162 5A |
| | | Effects of Skylight Polarization, Cloudiness, |
| Ecosystem Structure and Function. Proceedings of the Thirty-First Annual Biology | Alum Creek Lake, Alum Creek, Scioto River Basin, Ohio (Draft Environmental Impact | and View Angle on the Detection of Oil on Water, |
| Colloquium. | Statement). | W73-02183 5A |
| W73-02124 5C | W73-01986 8A | OIL-WATER INTERFACES |
| The Influence of Mist Irrigation on the Potato: III. Nutrient Content of Leaves, | Water Pollution by Oil-Field Brines and Re- lated Industrial Wastes in Ohio, | Effects of Long Chain Polymers on the Size Distribution of Oil-In-Water Emulsions, |
| W73-02442 3F | W73-02192 5B | W73-02120 5G |
| Investigations on Nutrient Factors Limiting | Leading Creek Conservancy District (Final En- | Petroleum Tanker Pollution Monitoring Unit, |
| Phytoplankton Productivity in Two Central Virginia Ponds, | vironmental Impact Statement). W73-02267 5F | W73-02194 5A |
| W73-02452 5C | | OIL WELLS |
| | Big Creek and Metro Zoo Flood and Aesthetic | A Proven Squeeze-Cementing Technique in a |
| NUTRITION Growth Responses of Young Sockeye Salmon | Improvement, Cleveland, Ohio (Draft Environ- mental Impact Statement). | Dolomite Reservoir, |
| (Oncorhynchus nerka) to Different Diets and | W73-02268 4A | W73-02421 8F |
| Planes of Nutrition, | Cost of Public Water Service in Ohio, | OKLAHOMA |
| W73-02571 8I | W73-02285 6C | Reuse of Surface Runoff from Furrow Irriga- |
| OBSERVATION WELLS | | tion, |
| Chemical Analyses of Water From Observation | OIL Description of Dellution From the Industrial | W73-02118 3F |
| Wells in the Edwards and Associated Limestones, San Antonio Area, Texas, 1967. | Prevention of Pollution From the Industrial Use of Oil. | ON-SITE INVESTIGATIONS |
| W73-02307 2K | W73-02434 5D | Carrying Capacity of Drilling Muds, |
| OCEAN CURRENTS | OIL CHARACTERIZATION | W73-02379 8B |
| Diffusivity of Suspended Matter in the Carib- | The West Falmouth Oil Spill. Data Available in | ONEIDA COUNTY (N.Y.) |
| bean Sea, | 1971. II. Chemistry, | Oneida Shows the Way To Go, |
| W73-02171 2J | W73-02024 5C | W73-02196 5D |
| DCEAN DUMPING | OIL INDUSTRY | ONTARIO (CANADA) |
| Prompt Passage of Ocean Dumping Bill is | The Delta-Log, a Differential Temperature Sur- | Under-Ice Observations of Wintering Sites of Leopard Frogs, |
| Urged, W73-02255 6E | veying Method, W73-02380 8G | W73-02583 2C |
| | | |

| W73-02262 OPERATING COSTS Pollution Cleanup Costs Nailed Down. W73-02283 Cost of Public Water Service in Ohio, W73-02285 OPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-02209 OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-0221 W73-0221 ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-0249 ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waster sand in Waste Treatment, W73-02499 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 OPTIMAL BOD OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02134 ORGANIC LOADING Investigations in Oregon-A Compilation of Peak Data Collected from October 1952 to September 1972, W73-02034 7C Coupling of Oxidation and Phospi Processes in the Leaves of Bean Pl Different Drought-Resistance (In Rust W73-02134 Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waters and in Waste Treatment, W73-02459 W73-02234 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02165 ORGANIC NUTRIENTS What's it all About. Algae, W73-02187 OPTIMAL BOD | orylation ants with ian), 3F Aerobic 5C robic Ox-Receiving 5C ic Comige, 5D Transfor- |
|--|--|
| Pollution Cleanup Costs Nailed Down. W73-02283 Cost of Public Water Service in Ohio, W73-02285 OPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-02290 OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02499 Water Economics, W73-02543 OPGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-02499 ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics Organic | orylation ants with ian), 3F Aerobic 5C robic Ox-Receiving 5C ic Comige, 5D Transfor- |
| Cost of Public Water Service in Ohio, W73-02285 Cost of Public Water Service in Ohio, W73-02285 COPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-0209 OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02291 Water Economics, W73-0233 Water Economics, W73-02439 Water Economics, W73-02439 Water Economics, W73-02449 Water Economics, W73-0249 Water Economics, W73-0249 Water Economics, W73-0249 Water Economics, W73-0249 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-0253 ORGANIC NUTRIENTS ORGANIC NUTRIENTS What's it all About. Algae, W73-02439 OCUpling of Oxidation and Phosp Processes in the Leaves of Bean Ploifferent Drought-Resistance (In Rust W73-0213) Kinetics of Polyelectrolytes, Mixing and pH Upon an Activated Sludy System, W73-02221 SD Kinetics of Biologically Mediated Ae idation of Organic Compounds in Waters and in Waste Treatment, W73-02430 Water Economics, W73-0249 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02535 ORGANIC NUTRIENTS What's it all About. Algae, W73-02489 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02543 ORGANIC NUTRIENTS What's it all About. Algae, W73-02489 OVERATIONS Exhiptics of Botterial Growth During Aerobic Oxidation of Organics, W73-02449 Water Economics, W73-0249 SC ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | orylation ants with ian), 3F Aerobic 5C robic Ox- Receiving 5C ic Com- ige, 5D Transfor- |
| Cost of Public Water Service in Ohio, W73-02560 OPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-0209 OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02449 Water Economics, W73-02543 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-0207 ORGANIC CARBON A Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludge System, W73-02211 SD ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waters and in Waste Treatment, W73-02449 ORGANIC COMPOUNDS Kinetics of Biologically Mediated Ae idiation of Organic Compounds in Waters and in Waste Treatment, W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02535 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02016 ORGANIC CRBON A Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludgian of Organics, W73-02449 Kinetics of Biologically Mediated Ae idiation of Organic Compounds in Waters and in Waste Treatment, W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02335 ONIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Sebilization Pond (and Management), W73-02438 | ian), 3F Aerobic 5C robic Ox- Receiving 5C ic Com- ige, 5D |
| W73-02285 6C W73-02560 6E W73-02134 OPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-02209 5F Sudge System, W73-02221 5D OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 2H OWAGE Economics, W73-02498 2H OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 5A ORGANIC CARBON A Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludy of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sudy of The Effects of Polyelectrolytes, Mixing and pH Upon an Act | 3F Aerobic 5C solic Ox- Receiving 3C ic Com- ige, 5D |
| OPERATIONS Design-Operation Interactions for Wastewater Treatment Plants, W73-02209 SF OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02543 W73-02543 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 A Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludge System, W73-02201 SD ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waters and in Waste Treatment, W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (in German), W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, W73-0243 Kinetics of Bacterial Growth During Oxidation of Organics, W73-02449 W73-02449 Kinetics of Biologically Mediated Ae idation of Organic Compounds in Waters and in Waste Treatment, W73-02450 W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (in German), W73-02450 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | 5C robic Ox- Receiving 5C ic Com- ic Com- ic, 5D |
| Design-Operation Interactions for Wastewater Treatment Plants, W73-02209 OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02543 W73-02543 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 A Statistical Study of The Effects of Polyelectrolytes, Mixing and pH Upon an Activated Sludge System, W73-0221 SD WATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02221 ORGANIC COMPOUNDS Kinetics of Biologically Mediated Ae idation of Organic Compounds in Waters and in Waste Treatment, W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-0235 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Sebilization Prond (and Management), W73-02438 | 5C robic Ox- Receiving 5C ic Com- ic Com- ic, 5D |
| Treatment Plants, W73-02209 SPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02499 Water Economics, W73-02449 W73-02449 WATS-02499 SORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-02449 SC Water Economics, W73-02449 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02543 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-0255 ORGANIC NUTRIENTS Water Economics, W73-02016 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-0253 ORGANIC NUTRIENTS What's it all About. Algae, W73-02449 W73-02449 W73-0253 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | robic Ox- Receiving 5C ic Com- ige, 5D Transfor- |
| OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02543 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 ABOUNG COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-02449 SC ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (in German), W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, W73-02438 Kinetics of Biologically Mediated Ae idation of Organic Waters and in Waste Treatment, W73-02450 W73-02450 Resistance of Carcinogenic Organ pounds to Oxidation by Activated Slu W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | robic Ox- Receiving 5C ic Com- ige, 5D Transfor- |
| OPERATIONS RESEARCH Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02543 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 A ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waters and in Waste Treatment, W73-02450 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, W73-02450 ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organic Compounds in Waters and in Waste Treatment, W73-02450 Waters and in Waste Treatment, W73-02450 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-0249 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation Pond (and Management), W73-02449 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation Pond (and Management), W73-02450 | 5C ic Com- ige, 5D |
| Proceedings, Fourteenth Conference on Great Lakes Research. W73-02498 Water Economics, W73-02499 Water Economics, W73-02499 ORGANIC COMPOUNDS Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-02499 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02016 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, W73-0248 Waters and in Waste Treatment, W73-02450 W73-02450 ORGANIC COMPOUNDS Resistance of Carcinogenic Organ pounds to Oxidation by Activated Slu W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | 5C ic Com- ige, 5D |
| W73-02498 Water Economics, W73-02449 W73-02543 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02027 ORGANIC NUTRIENTS What's it all About. Algae, Oxidation of Organics, W73-0249 SC Resistance of Carcinogenic Organ pounds to Oxidation by Activated Slue W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02027 Water Economics, W73-0249 SC Resistance of Carcinogenic Organ pounds to Oxidation by Activated Slue W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | ic Com- ige, 5D |
| Water Economics, W73-02543 ORGANIC LOADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02555 Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 SOURCE COADING Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02016 ORGANIC NUTRIENTS What's it all About. Algae, Pounds to Oxidation by Activated Slue W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | 5D Transfor- |
| W73-02543 4B ORGANIC LOADING W73-02535 OPTICAL PROPERTIES Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 5A ORGANIC NUTRIENTS What's it all About. Algae, W73-02438 W73-02535 OXIDATION LAGOONS Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | 5D Transfor- |
| Investigations on the Loading of the Untertrave with Sewage, (In German), Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 5A ORGANIC NUTRIENTS What's it all About. Algae, Investigations on the Loading of the Untertrave with Sewage, (In German), W73-02016 SC Groundwater Recharge and Quality mations During Initiation of a New Se bilization Pond (and Management), W73-02438 | Transfor- |
| Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, W73-02027 5A ORGANIC NUTRIENTS What's it all About. Algae, ORGANIC NUTRIENTS What's it all About. Algae, ORGANIC NUTRIENTS What's it all About. Algae, | |
| Southern Monterey Bay, W73-02027 | |
| W73-02027 5A ORGANIC NUTRIENTS bilization Pond (and Management), What's it all About. Algae, W73-02438 | wage Sta- |
| What's it all About. Algae, W73-02438 | |
| OPTIMAL ROD W72.02197 | 5B |
| | |
| Nonlinear Optimal Control Theory Applied to a Distributed Feed Biochemical River Reactor ORGANIC WASTES OXIDATION-REDUCTION POTENTIA Oxidation-Reduction Potentials, Oxy | |
| with Dual Water Quality and Self Purification Measures of Organic Pollutants in Wastewater centration and Oxygen Uptake of | rofundal |
| Restraints, Treatment Plant Operations, Sediments in a Eutrophic Lake, | |
| W73-02352 5G W73-02334 5D W73-02451 | 5C |
| OPTIMIZATION ORGANOPHOSPHORUS COMPOUNDS OXYGEN | |
| Economic Analyses of Optimal Water Quality Effects of an Organophosphorus Insecticide on Oxidation-Reduction Potentials, Oxy | gen Con- |
| Management, the Phytoplankton, Zooplankton, and Insect centration and Oxygen Uptake of W73-01951 5G Populations of Fresh-Water Ponds, Sediments in a Eutrophic Lake, | rofundal |
| W73-01951 5G Populations of Fresh-Water Ponds, Sediments in a Eutrophic Lake, W73-02453 5C W73-02451 | 5C |
| Optimization of Water Resources Develop- | - |
| ment: Optimization of Capacity Specifications for Components of Regional, Complex In- The Hydrological Conditions for the Entry of A Method for Isolating Suspended Science Complex In- | lide from |
| for Components of Regional, Complex In- tegrated, Multipurpose Water Resources Sagitta Enflata Into Osaka Bay: II. In The Case Sewage Effluents for Measurement of | |
| Systems, of Appearance of a Cold Water Mass (In Demand, | |
| W73-01970 6A Japanese), W73-02207 W73-02587 2L | 5D |
| W73-02587 Nonlinear Optimal Control Theory Applied to a OXYGEN UPTAKE | |
| Distributed Feed Biochemical River Reactor OSMATIC PRESSURE Oxidation-Reduction Potentials, Oxy | gen Con- |
| with Dual Water Quality and Self Purification Studies on Reverse Osmosis for Water Pollucentration and Oxygen Uptake of | rofundal |
| Restraints, tion Control, Sediments in a Eutrophic Lake, W73-02352 5G W73-02255 5D W73-02451 | 5C |
| | 30 |
| How to Dull a Bit for Fun and Profit, OUTFALL SEWERS OXYGENATION W72-02387 Polyethylene Pipe Used for 36-In Sewage Out- Hypolimnion Aeration, | |
| W73-02387 8G Polyethylene Pipe Used for 36-In Sewage Out- fall. Hypolimnion Aeration, W73-02137 | 5F |
| A Mixed Integer Programming Approach to W73-02188 5D | - |
| Planning Multiple Water Sources for Municipal Water Supply. OUTLETS PACIFIC NORTHWEST U.S. Proceedings 1971 Technical Confe | |
| Water Supply, W73-02540 OUTLETS Proceedings 1971 Technical Confe Estuaries of the Pacific Northwest. | ence on |
| fall. W73-02454 | 5C |
| Modeling and Optimization of a Tower-Type W73-02188 Activated Shides System Legal Protection of the Pacific 1 | orthwest |
| Activated Sludge System, W73-02553 5D OUTWASH PLAINS Legal Protection of the Pacific R Estuaries, | Oldiwest |
| Some Sedimentological Aspects of the Flu- W73-02459 | 5C |
| OPTIMUM DEVELOPMENT PLANS vioglacial Outwash Plain Near Soesterberg PACIFIC SALMON | |
| Further Studies of Optimum Operation of Desalting Plants as a Supplemental Source of W73-02159 The Netherlands, Pacific Salmon Pacific Salmon Aspects of the Characterization, Iden | ification, |
| Firm Yield. and Ecology of the Bacterial Flora A | |
| W73-02082 3A OVERLAND FLOW with the Surface of Stream-Incubating The Effects of Selective Erosion by Overland Salmon (Oncorhynchus) Eggs, | g Pacific |
| Optimum Conjunctive Use of a Dual-Purpose Flow on the Ice-Pushed Ridges of Uelsen W73-02565 | 91 |
| Desalting Plant and Multi-Purpose Surface (County Bentheim, Germany), | |
| Water Reservoirs, W73-02157 2J PALEOCLIMATOLOGY | |
| W73-02083 A Nomograph Based on Kinematic Wave Shelf Area, East Antarctica, and Thei | West Inc |
| Watershed Project Evaluation Involving Multi- Theory for Determining Time of Concentration Geological and Palaeoclimatologi | |
| ple Social Objectives, for Overland Flow, nificance, | Possible |

PHENO Ecolo Darra W73-

Recor Speci Ruma W73-4

PHENO Pheno Select W73-4

Chara 'Bloo W73-4

PHOSPI Techr Laund W73-6

PHOSPI Radio Phosp W73-0

PHOSPI Optica South W73-0

Effect Mech W73-0

Waste W73-0

Anion

Phosp W73-0

Studio tion C W73-0

Radio Phosp W73-0

PHOSPI Chem Agrica W73-0

Nutrie W73-0

What' W73-0

Phosp W73-0

Role of fuse S W73-0

PHOSPE After Coupli Proces Differ W73-0

PHOTO: Measu W73-0

PALYNOLOGY

| PALYNOLOGY Reworked Palynomorphs from the West Ice Shelf Area, East Antarctica, and Their Possible | PEAT Biological Characteristics of Cranberries and the Problem of Their Cultivation. 1. Effect of | PERTURBATION Thermal Effects of Power Plants on Lakes, W73-02068 2H |
|--|--|--|
| Geological and Palaeoclimatological Sig- nificance, W73-02495 2J | Ground Water Level, Sand Layer Thickness and Type of Peat on Rootage of Cuttings and Shoot Growth, (In Lithuanian), | PEST CONTROL Water Quality Criteria Data Book - Volume 3: |
| | W73-02025 3F | Effects of Chemicals on Aquatic Life, Selected |
| PAPER AND BOARD INDUSTRY Towards Greater Water Re-Use, | PECHORA'S FLOODPLAIN | Data from the Literature Through 1968. W73-01976 5C |
| W73-02286 5D | The Trifolium L. Species of Pechora's Flood- plain, | PESTICIDE KINETICS |
| PARANA RIVER New Cases of Aquatic Epiphytes, (In Spanish), W73-02551 2I | W73-02005 3F | Metabolism of DDT by Fresh Water Diatoms, W73-02280 5C |
| | PENNSYLVANIA The Contribution of Leptodora and Other | PESTICIDE REMOVAL |
| PARASITE FAUNA The Effect of Ecological Conditions on the | Zooplankton to the Diet of Various Fish, W73-02031 5C | Chemical and Sediment Movement from Agricultural Land into Lake Erie, |
| Parasite Fauna of Perch Perca Fluviatilis L. In Lake Dargin. | | W73-01957 5B |
| W73-02500 5C | 15 Towns Join Hands, W73-02223 5D | PESTICIDE RESIDUES |
| PARTICLE SIZE | The state of the s | Transfer of Pesticides Through Water, Sedi- |
| Optical Signatures of the Near-Shore Waters of Southern Monterey Bay, | Compositional Logging of Air-Drilled Wells, W73-02377 8B | ments and Aquatic Life, W73-01959 5B |
| W73-02027 5A | | W 13-01333 |
| Recent Sediments of the Central California | PEPTIDES Structural Aspects of Amide-Water Systems, | Pesticides and Freshwater Fauna, W73-02098 5B |
| Continental Shelf-Pillar Point to Pigeon Point: | W73-02343 5A | Accumulations of Certain Pesticides in Adipose |
| Part B. Mineralogical Data, W73-02319 2J | PERCH | Tissues and Performance of Angus, Hereford |
| | The Effect of Ecological Conditions on the | and Holstein Steers Fed Apple Processing |
| PASSAIC RIVER (NJ) Nonlinear Optimal Control Theory Applied to a | Parasite Fauna of Perch Perca Fluviatilis L. In Lake Dargin. | Wastes, |
| Distributed Feed Biochemical River Reactor | W73-02500 5C | W73-02204 · 5C |
| with Dual Water Quality and Self Purification | PERCUSSIVE FORCES | Microbial Degradation of Pesticides in Aqueous |
| Restraints, W73-02352 5G | Some Results of Dri Investigations-Rock | Solutions, W73-02534 5B |
| | Failure in Percussion, | The state of the s |
| PASSIVE PRESSURE A Theoretical Study of the Pressures Acting on | W73-02406 8E | PESTICIDE TOXICITY |
| a Rigid Wall by a Sloping Earth or Rock Fill, W73-02077 8D | PERFORATED WELL CASING Hydraulic Properties of Perforated Well Cas- | Pesticides and Freshwater Fauna, W73-02098 5B |
| PATENTS | ings, W73-02395 | Removal of Toxic Pesticides by Reverse Osmo- |
| Seismic Borehole Plug, | | sis Water Treatment, W73-02222 5D |
| W73-02384 8C | PERIPHYTON Taxonomy of North Shore Periphyton, Lake | A substance of the part of the contract of the |
| PATH OF POLLUTANTS Analysis of Thermal Pollution Dispersion, | Superior, Castle Danger Studies 1970-1971, W73-02555 5C | Pesticide-Induced Stress Profiles, W73-02274 5C |
| W73-01962 5B | Pollution and the Ecology of Nearshore | The Molluscicide Action of Thiol Reagents (Die |
| Radionuclides in Transport in the Columbia River from Pasco to Vancouver, Washington, W73-02022 5B | Periphyton of Lake Superior: The Effects of Calefaction on Periphyton, | Molluscizide Wirkung Von Thiol-Reagentien), W73-02275 SC |
| W73-02022 5B | W73-02556 5C | PESTICIDES |
| Information on the Velocity and Flow Pattern of Detroit River Water in Western Lake Erie | PERIPHYTON POPULATIONS Taxonomy of North Shore Periphyton, Lake | Water Quality Criteria Data Book - Volume 3: Effects of Chemicals on Aquatic Life, Selected |
| Revealed by an Accidental Salt Spill, W73-02057 5B | Superior, Castle Danger Studies 1970-1971, | Data from the Literature Through 1968. W73-01976 5C |
| W/3-0205/ | W73-02555 5C | 11/10/2007 |
| Contents and Behaviour of Mercury as Com- pared with Other Heavy Metals in Sediments | PERMAFROST Ice-Cored Moraines in Southern British Colum- | Analysis of Chlorinated Hydrocarbon Pesti- cides in Waters and Wastewaters, |
| from the Rivers Rhine and Ems, W73-02158 5B | bia and Alberta, Canada, | W73-02313 5A |
| | W73-02042 2C | An Appraisal of the PCB Situation in the State |
| A Hybrid Computer Program for Predicting the Chemical Quality of Irrigation Return Flows, | Rotary Drilling and Coring in Permafrost: Part III, Deep Core Drilling, Core Analysis and | of Wisconsin, W73-02447 SC |
| W73-02177 5B | Bore Hole Thermometry at Cape Thompson, | REPROLED |
| A Mass Balance Model of Trace Metals in | Alaska, W73-02312 8B | PETIOLAR The Influence of Mist Irrigation on the Potato: |
| Several Delaware WatershedsA Progress Re- port, | | III. Nutrient Content of Leaves, |
| W73-02341 5B | PERMEABILITY Effects of Temperature on Osmotic and Ionic | W73-02442 3F |
| PEAK DISCHARGE | Effects of Temperature on Osmotic and Ionic Regulation in Goldfish, | PETIOLES |
| Crest-Stage Gaging Stations in OregonA Com- | W73-02103 5C | The Influence of Mist Irrigation on the Potato: III. Nutrient Content of Leaves, |
| pilation of Peak Data Collected from October 1952 to September 1972, | Development Work is Essential. | W73-02442 3F |
| W73-02034 7C | | PETROLOGY |
| A Summary of Peak Stages and Discharges in | PERSISTENCE | A Regional Geophysical Investigation of the |
| New York for the Flood of June 1972, | Metabolism of DDT by Fresh Water Diatoms, | Green Bay Area, |
| W73-02492 2E | W73-02280 5C | W73-02502 2H |

| PHENOLOGY | PHOTOSYNTHESIS | PISCIVOROUS FISHES |
|--|--|--|
| Ecological Observations on Soldanella Villosa | A Regulatory Mechanism for CO2 Assimilation | Utilization of Alewives by Inshore Piscivorous |
| Darracq, W73-02217 2I | in Plant Photosynthesis: Activation of Ribu- lose-1,5-Diphosphate Carboxylase by Fructose | Fishes in Lake Michigan, W73-02578 2H |
| W/3-0221/ | 6-Phosphate and Deactivation by Fructose 1,6- | The state of the s |
| Records About Ecology of Some Characeae | Diphosphate, | PLANES OF WEAKNESS |
| Species from the Floodplain of the Danube, (In Rumanian). | W73-02474 5C | Shear Failure of Anistropic Rocks, W73-02374 8E |
| W73-02249 2I | PHYSICAL CHARACTERISTICS | A Fracture Criterion for Brittle Anisotropic |
| PHENOLS | Assessment of Turbidity, Color, and Odor in | Rock, |
| Phenol Sorption by Activated Carbon and | Water, W73-01971 5G | W73-02397 8E |
| Selected Macroporous Resins, | PHYSICAL PROPERTIES | PLANKTON |
| W73-02206 5D Characterization of Phenols in Areas of Water | Rotary Drilling and Coring in Permafrost: Part | Diatoms from Seven Iowa Rivers, W73-02011 2I |
| 'Blooming' in Open Bodies of Water, | III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, | PLANKTONS |
| W73-02460 5C | Alaska, | A Simple Device for the Sorting of Living |
| PHOSPHATE-FREE DETERGENTS | W73-02312 8B | Planktonic Copepods, |
| Technical Evaluation of Phosphate-Free Home | Mathematical Description of Biological and | W73-02598 7B |
| Laundry Detergents, | Physical Processes in Heated Streams, | PLANNING |
| W73-02351 5C | W73-02468 5C | Optimization of Water Resources Develop- |
| PHOSPHATE NODULES | PHYTOPLANKTON | ment: Optimization of Capacity Specifications for Components of Regional, Complex In- |
| Radiometric Evidence for Recent Formation of | DDT Residues in Coastal Marine Phytoplank- | tegrated, Multipurpose Water Resources |
| Phosphatic Nodules in Marine Shelf Sediments, | ton and Their Transfer in Pelagic Food Chains, | Systems, |
| W73-02497 2J | W73-02105 5C | W73-01970 6A |
| PHOSPHATES | Investigations on Nutrient Factors Limiting | Administering State Water Resources: The |
| Optical Signatures of the Near-Shore Waters of | Phytoplankton Productivity in Two Central Vir- | Need for Long Range Planning, |
| Southern Monterey Bay, | ginia Ponds, | W73-01979 6E |
| W73-02027 5A | W73-02452 5C | Design-Operation Interactions for Wastewater |
| Effect of Polymer Fertilizers on the Structural- | Effects of an Organophosphorus Insecticide on | Treatment Plants, |
| Mechanical Properties of Soil (In Russian), | the Phytoplankton, Zooplankton, and Insect | W73-02209 5F |
| W73-02140 2G | Populations of Fresh-Water Ponds, | Procedures for Evaluation of Water and Re- |
| Wastemates Treatment by Ion Frederica | W73-02453 5C | lated Land Resource Projects. |
| Wastewater Treatment by Ion Exchange, W73-02202 5D | Multivariate Approaches to Algal Strategies | W73-02271 6G |
| | and Tactics in the Systems Analysis of | The Development of Israel's Water Resources. |
| Anion Exchange Equilibria Involving | Phytoplankton, | W73-02292 6B |
| Phosphate, Sulphate and Chloride, W73-02208 5D | W73-02469 5C | Water Market Market Market |
| W13-02208 | Quantitative Description of the Initial Links of | Wastewater Treatment Works Planning, Economics and Technology-Some New |
| Studies on Reverse Osmosis for Water Pollu- | the Production Process in the Shallow-Water | Directions, |
| tion Control, | Bays of the Posiet Bau (Japanses Sea), (In Rus- | W73-02296 5D |
| W73-02225 5D | sian), W73-02597 5C | Authorization and Appropriation Processes for |
| Radiometric Evidence for Recent Formation of | | Water Resource Development, |
| Phosphatic Nodules in Marine Shelf Sediments, | PIKE PERCH | W73-02364 6E |
| W73-02497 2J | Distribution of Fish in the Volgograd Reser- | Courts and Water, The Role of the Judicial |
| PHOSPHORUS | voir, (In Russian), W73-02591 2H | Process, |
| Chemical and Sediment Movement from | | W73-02365 6E |
| Agricultural Land into Lake Erie, | PIKE RATIONS | Water Personne Blancine |
| W73-01957 5B | Pike Rations in the Kremenchung Reservoir (In Russian). | Water Resource Planning. W73-02368 6B |
| Nutrient Removal by Waterhyacinth, | W73-02596 2H | |
| W73-02122 5G | | Effects of Institutional Constraints and Resources Planning on Growth in and Near |
| What's it all About Alexa | PINE G | Estuaries. |
| What's it all About. Algae, W73-02187 5G | Recent Climatic Change and Development of the Bristlecone Pine (P. Longaeva Railey) | W73-02465 5C |
| Physikama Ramouel in Triabling Filters | Krummholz Zone, Mt. Washington, Nevada, | Proposed Experimental Programs for Testing |
| Phosphorus Removal in Trickling Filters, W73-02220 5D | W73-02169 4A | Remote Sensor Applications in the |
| 117-02220 | PINE RIVER (WIS) | Metropolitan Washington Area, W73-02491 7B |
| Role of Phosphorus in Eutrophication and Dif- | Aquatic Insects of the Pine-Popple River, | W73-02491 7B |
| fuse Source Control, | Wisconsin, | A Mixed Integer Programming Approach to |
| W73-02478 5C | W73-02097 5C | Planning Multiple Water Sources for Municipal |
| PHOSPHORYLATION | PINUS SYLVESTRIS G | Water Supply, W73-02540 6A |
| After Effect of Atmospheric Drought of | Chorology, Ecology and Sociology of Chima- | |
| Coupling of Oxidation and Phosphorylation Processes in the Leaves of Bean Plants with | phila Umbellata (L.) Bart. In Slovenia (Yu- | Modeling and Sensitivity Analysis for Planning |
| Different Drought-Resistance (In Russian), | goslaviaia), W73-02272 2I | Decisions in Water Resources Expansion, W73-02541 4A |
| W73-02134 3F | | |
| | PIPE-TYPE CABLES | PLANORBIS SPP. |
| PHOTOMETERS Measurement of Low Turbidities. | Researchers Seek Ways to Lower Costs of Un- derground Transmission Systems, | The Molluscicide Action of Thiol Reagents (Die Molluscizide Wirkung Von Thiol-Reagentien), |
| W73-02147 5A | W73-02074 8C | W73-02275 SC |
| | | |

The Cool Plant W73-

The I

The I

A Stu Potat Bean W73-

POTEN Heav with gent 1 W73-

POULT Effect Surfa W73-

POWEI Powe Flucts W73-4

PRECA Preca Crib V W73-6

PRECIS Recor Groun Assoc Texas W73-6

The C tion, W73-0

PREGL. New 1 W73-0

Effect Conte Soils, W73-0

PRESSU Specia Data, W73-0

Model W73-0

PRICES The F W73-0

PRIMAI An E Penns Oxyge W73-0

PLANT DESIGN

| PLANT DESIGN | Effects of Skylight Polarization, Cloudiness, | An Appraisal of the PCB Situation in the State |
|---|---|--|
| Design-Operation Interactions for Wastewater | and View Angle on the Detection of Oil on | of Wisconsin, |
| Treatment Plants, W73-02209 SF | Water, W73-02183 5A | W73-02447 5C |
| W73-02209 5F | | POLYELECTROLYTES |
| The Eyes of Texas Are on U.S. Gypsum, W73-02226 5D | Petroleum Tanker Pollution Monitoring Unit, W73-02194 5A | A Statistical Study of The Effects of Polyelec- trolytes, Mixing and pH Upon an Activated |
| PLANT GROWTH | Analysis of Chlorinated Hydrocarbon Pesti- | Sludge System, W73-02221 5D |
| Kinetics of Bacterial Growth During Aerobic | cides in Waters and Wastewaters, | 10000 |
| Oxidation of Organics, | W73-02313 5A | POLYMERS |
| W73-02449 5C | POLLUTION ABATEMENT | Effects of Long Chain Polymers on the Size |
| The Response of Root and Shoot Growth to | Repair and Protect Our Natural Environment, | Distribution of Oil-In-Water Emulsions, W73-02120 5G |
| Decreases in Soil Water Potential, | W73-01993 6E | # 13-02120 JG |
| W73-02558 2I | Prompt Passage of Ocean Dumping Bill is | Effect of Polymer Fertilizers on the Structural- |
| LANT PHYSIOLOGY | Urged, | Mechanical Properties of Soil (In Russian), W73-02140 2G |
| Metabolism of DDT by Fresh Water Diatoms, | W73-02255 6E | W73-02140 2G |
| W73-02280 5C | Confessor Bosset on C 2770 Amendian | POLYMORPHISM |
| LASTIC PIPES | Conference Report on S.2770, Amending Federal Water Pollution Control Act. | Salinity-Related Polymorphism in the Brackish- |
| Polyethylene Pipe Used for 36-In Sewage Out- fall. | W73-02256 6E | Water Diatom Cyclotella Cryptica, W73-02548 5C |
| W73-02188 5D | Pollution Control Shines in Chrome Chemicals | PONDEROSA PINE |
| LATING WASTES | Plant. | Ponderosa Pine Planting Techniques, Survival |
| Saving the Dragout Keeps Plater Within | W73-02282 5G | and Height Growth in the Idaho Batholith, |
| Discharge Limits, | Pollution Cleanup Costs Nailed Down. | W73-02579 4A |
| W73-02227 5D | W73-02283 5G | |
| LEISTOCENE EPOCH | | PONDWEEDS The Impact of Reduced Light Penetration on a |
| A Contribution to the Sedimentary Petrological | Towards Greater Water Re-Use, W73-02286 5D | Eutrophic Farm Pond, |
| Description of the Maas Deposits in Southern | W/3-02286 | W73-02349 5C |
| Limburg (The Netherlands), | Power, Pollution, and Public Policy, Issues in | Margaret of the local to purpose of behavioral |
| W73-02153 2J | Electric Power Production, Shoreline Recrea- | POROSITY The Sidewall Epithermal Neutron Porosity |
| The Effects of Selective Erosion by Overland | tion, and Air and Water Pollution Facing New England and the Nation. | Log, |
| Flow on the Ice-Pushed Ridges of Uelsen | W73-02299 6G | W73-02396 8G |
| (County Bentheim, Germany), | to a product when the same particular specific | |
| W73-02157 2J | Water Pollution Control in the United States. | PORTLAND CEMENTS |
| Wisconsin Boulder Flow and Its Geomorphic | W73-02366 5G | Well Grouting and Well Protection, W73-02408 |
| Implications, Franklin Mountains, El Paso | Water wells and Ground Water Contamination, | W 13-02400 8F |
| County, Texas, W73-02487 2J | W73-02413 5B | POSIET-BAU |
| | Prevention of Pollution From the Industrial | Quantitative Description of the Initial Links of |
| LUGS | Use of Oil, | the Production Process in the Shallow-Water Bays of the Posiet Bau (Japanses Sea), (In Rus- |
| Seismic Borehole Plug, W73-02384 8C | W73-02434 5D | sian), |
| | Environmental Quality. A Challenge for | W73-02597 5C |
| OLAND | Achievement, | BANKER WILLIAM |
| The German Carp (Carassius auratus gibelio Bloch) from the Ilownica River Stocked in a | W73-02485 5G | POTABLE WATER Development of a Tape Transport Bacterial De- |
| Carp Pond, | Toward Effective and Equitable Belleting Con | tection System; Final Report, |
| W73-02026 8I | Toward Effective and Equitable Pollution Con- trol Regulation, | W73-02012 5A |
| Oversequies of the Dom Becomisis at Gostal | W73-02520 5G | Different of Deleter Westernial Different |
| Overgrowing of the Dam Reservoir at Goczal- kowice in the Years 1967-1969, | BOTT TIPLON TA VEC (CH A BODO) | Effect of Drinking Water with Different Chloride Contents on Experimental Animals, |
| W73-02088 2H | POLLUTION TAXES (CHARGES) Sewer Surcharges and Their Effect on Water | (In Russian), |
| Dona (I amaiama I amaiama I) from the Hanna | Use, | W73-02020 5C |
| Dace (Leuciscus Leuciscus L.) from the Upper Vistula and Czarna Przemsza, | W73-02295 5G | Some Studies on the Chronic Toxicity of Cad- |
| W73-02090 2I | POLY PROPYLENE LIGHT TRAP | mium and Hexavalent Chromium in Drinking |
| The Effect of Ecological Conditions on the | A Polypropylene Light Trap for Aquatic Inver- | Water, |
| Parasite Fauna of Perch Perca Fluviatilis L. In | tebrates, | W73-02428 5C |
| Lake Dargin, | W73-02458 7B | POTATO |
| W73-02500 5C | POLYCHLORINATED BIPHENYLS | Influence of Mist Irrigation on Growth, Yields, |
| POLLUTANT IDENTIFICATION | Transfer of Pesticides Through Water, Sedi- | and Quality of Potatoes and Snap Beans, |
| Trace-Quantity Engineering, | ments and Aquatic Life, | W73-01966 3F |
| W73-02028 5A | W73-01959 5B | A Study of the Effects of Mist Irrigation on the |
| Microwave Emission Characteristics of Oil | Chlorobiphenyls (PCBs) in the Milwaukee | Potato (Solanum tuberosum L.) and the Snap |
| Slicks, | River, | Bean (Phaseolus vulgaris L.), |
| W73-02162 5A | W73-02084 5C | W73-01967 3F |
| Laboratory Methods for the Measurement of | Methods for Organic Pesticides in Water and | The Influence of Mist Irrigation on the Potato |
| Pollutants in Water and Waste Effluents, | Wastewater. | IV. Tuber Quality Factors, |
| W73-02167 5A | W73-02436 5A | W73-01968 3F |

| The Influence of a Short Period of Evaporative | Christoffele V. Alter Presenting Inc. (Prints | PSAMMON (SUBTERRANEAN) |
|--|---|--|
| Cooling on the Distribution of 14C in Potato Plants, | Christoffels V. Alton Properties, Inc. (Private Suits Barred Under State Statute Pertaining to | The Principle of Dispersal of the Subterranean Psammon at the Transition Between Seawater |
| W73-01969 3F | Filling in of Lakes). | and Freshwater, |
| | W73-02243 6E | W73-02599 2L |
| The Influence of Mist Irrigation on the Potato: | - August Barrell Barrell Philippina | Control of the street of the state of the |
| II. Growth and Development, | PRODUCTIVITY | PSYCHOLOGICAL ASPECTS |
| W73-02441 3F | Investigations on Nutrient Factors Limiting | Up and Down with Ecology-The 'Issue-Atten- |
| The Influence of Mist Irrigation on the Potato: | Phytoplankton Productivity in Two Central Vir- | tion Cycle', W73-02259 6G |
| III. Nutrient Content of Leaves, | ginia Ponds, | W73-02259 6G |
| W73-02442 3F | W73-02452 5C | PUBLIC ACCESS |
| State of the second sec | PROFILES | Pigorsh V. Fahner (Exclusive Use of Privately |
| POTATO CHIPS | Pesticide-Induced Stress Profiles, | Owned Lake). |
| A Study of the Effects of Mist Irrigation on the | W73-02274 5C | W73-02531 6E |
| Potato (Solanum tuberosum L.) and the Snap | | NOW HAND AND A STREET OF STREET OF STREET |
| Bean (Phaseolus vulgaris L.), W73-01967 3F | PROGRAMS | PUBLIC HEALTH |
| W/3-0190/ | Research Projects in Glaciology, 1972. | Effect of Donetsk Mineral Water on the Clini- cal Course of Chronic Cholangiohepatitis, (In |
| POTENTIOMETRY | W73-02314 2C | Russian), |
| Heavy Metal Ion Interaction and Transport | AND A MORE DE LA MANDA O | W73-02002 5C |
| with Synthetic Complexing Agents and Deter- | PROJECT PLANNING | |
| gent Phosphate Substitutes in Aquatic Systems, | Revision of Completed Regional or River Basin | E. Coli as an Indicator Organism for Disinfec- |
| W73-02112 5A | Plans, A Policy Statement. W73-01992 6B | tion of Water with Respect to Enteroviruses |
| BOTH TOV MANUEL | W73-01992 6B | Under Various Conditions, |
| POULTRY MANURE Effect of Animal Wastes Applied to Soils on | Proposed Principles and Standards for Planning | W73-02085 5F |
| Surface and Ground Water Systems, | Water and Related Land Resources. | Effect of Dietry Deficiency of Trace Elements |
| W73-01960 5B | W73-02231 6E | (Cu, Mo, Mn) on Water and Electrolyte |
| 35 | | Metabolism, |
| POWER SPECTRAL ANALYSIS | Report to the Water Resources Council by the | W73-02086 5C |
| Power Spectral Analysis of Water Temperature | Special Task Force, Findings and Recommen- | |
| Fluctuations, | dations. W73-02232 6E | Disinfection of Drinking Water Containing En- |
| W73-02180 5B | W73-02232 6E | teroviruses with Electrolytic Products of Com- |
| PRECAST CONCRETE | Sierra Club V. Froehlke (Judicial Review of | mon Salt, W73-02089 5F |
| Precast Concrete Should Prove Popular for | Environmental Impact Statement). | W 13-02009 |
| Crib Walling. | W73-02238 6E | Studies of the Effect of Desalinated Drinking |
| W73-02079 8F | | Water on the Functional State of the Organism, |
| 473 02013 | Watershed Project Evaluation Involving Multi- | W73-02091 5F |
| PRECIPITATION (ATMOSPHERIC) | ple Social Objectives, | Committee Water Delication Day of Day |
| Records of Precipitation, Aquifer Head, and | W73-02348 6B | Community Water Pollution R and D Needs. W73-02144 5G |
| Ground-Water Recharge to the Edwards and | Preliminary Analysis of Surface Water Availa- | W 73-02144 3G |
| Associated Limestones, San Antonio Area, | bility. | On the Significance of Urochrome in Endemic |
| Texas,-1968. | W73-02544 4A | Goiter, |
| W73-02308 2F | 1177 | W73-02425 5F |
| The Content of Various Elements in Precipita- | PROJECTIONS | |
| tion, | Great Lakes Basin Commission Challenges for | Some Studies on the Chronic Toxicity of Cad- |
| W73-02588 2K | the Future. An Interim Report on the Great | mium and Hexavalent Chromium in Drinking Water, |
| 1 | Lakes Basin Framework Study. | W73-02428 5C |
| PREGLACIAL RIVERS | W73-02291 6B | W 15-02-120 |
| New Evidence for Spencer's Laurentian River, | PROJECTS | The Effects on Man of Low Concentrations of |
| W73-02505 2H | Surface Waters of a Small City (Springfield, | Uranium, |
| PRESSURE HEAD | Mass). | W73-02429 5C |
| Effect of Temperature on Pressure Head-Water | W73-01961 6G | PUBLIC HEALTH STANDARDS |
| Content Relationship and Conductivity of Two | 1175 01761 | Community Water Pollution R and D Needs. |
| Soils. | Summary of Current Research on Snow and | W73-02144 5G |
| W73-02339 2G | Ice in Canada. | 1175-02144 |
| | W73-02310 2C | PUBLIC INVESTMENTS |
| PRESSURE MEASURING INSTRUMENTS | Parameter to the Charlestone 1000 | Principles and Problems of Municipal Financ- |
| Special Application of Drill-Stem Test Pressure | Research Projects in Glaciology, 1972. W73-02314 2C | ing, |
| Data, | W/3-02314 2C | W73-02289 6C |
| W73-02383 8G | PROTOTYPES | PUBLIC LANDS |
| PRESSURE RIDGES (SEA ICE) | The Potential of Physical Models to Investigate | The Drive To Save America's Shorelines. |
| Model of Pressure Ridge Formation in Sea Ice, | Estuarine Water Quality Problems, | W73-02248 6E |
| W73-02172 2C | W73-02455 5C | |
| | | PUBLIC UTILITIES |
| PRICES | PROVENANCE | Rate Design and Cost of Service, |
| The Framework for Analysis, | On the Use of Stable Isotopes to Trace the | W73-02298 6C |
| W73-02300 6G | Origins of Ice in a Floating Ice Tongue, W73-02168 2C | PUBLICATIONS |
| PRIMARY PRODUCTIVITY | W73-02168 2C | Bibliography on the Hydrogeology of Siberia |
| An Estimate of Primary Productivity in a | Morphology and Recent Sediments of the | and the Soviet Far East for the Period 1918- |
| Pennsylvania Trout Stream Using a Diurnal | Western Alboran Basin in the Mediterranean | 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. |
| Oxygen Curve Technique, | Sea. | Bibliograficheskiy ukazatel'. 1918-1965), |
| W73-02030 5A | W73-02494 2J | W73-02058 2F |

Cha mer W7:

The W7

RECR A S on I W73

Grow Mati New W73

REDR

Eco-Influ mina and the I W73

REFUS Repa

Unit Ches tions W73

Power Election, Engl

Regis Proto W73-

Regio Wast W73-

REGIO Econ Mana W73-

Revis Plans W73-

Oneid W73-

REGIO Regio Proto W73-

REGIO Regio Proto W73-4

REGIO Regio Waste W73-6

Wates W73-4

PUBLICATIONS

| A Dictionary of Hydrogeology and Engineering Geology (Slovar' po gidrogeologii i inzhenemoy geologii). W73-02064 | QUEENSLAND (AUSTRALIA) A Shallow Artesian Aquifer in the Tertiary Deposits of Southern Cape York Peninsula, W73-02309 4B | Annual Compilation and Analysis of Hydrolog- ic Data for Little Elm Creek, Trinity River Basin, Texas, 1970, W73-02324 7C |
|--|--|---|
| Evaluation of Selected Aspects of Communica- tion of Water Resources Research Information Among University Researchers and Users, W73-02357 6B | RADIATION Microwave Emission Characteristics of Oil Slicks, W73-02162 5A | Storm Runoff Coefficients for Rivers of the Ukraine and Moldavia (Koeffitsiyenty stoka dozhdevykh pavodkov na rekakh Ukrainy i Moldavii), W73-02333 |
| PUBLICITY Manager's Role in the Decision Making Process, W73-02127 6B | RADIOACTIVE DATING Radiometric Evidence for Recent Formation of Phosphatic Nodules in Marine Shelf Sediments, W73-02497 23 | Annual Streamflow Fluctuations in the Dni- ester River Basin (Kolebaniya godovogo stoka rek basseyna Dnestra), W73-02335 4A |
| PUEBLO DAM AND RESERVOIR (COLORADO) Pueblo Dam and Reservoir, Fryingpan-Arkan- sas Project Colorado (Final Environmental Im- pact Statement). W73-02265 8D | RADIOACTIVE WASTE DISPOSAL Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear- Powered Ships and Their Support Facilities, W73-01982 5B | Annual Compilation and Analysis of Hydrolog- ic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, W73-02482 7C |
| PUERTO RICO Determination of the Rate of Biodegradation in Some Polluted Tropical Waters and in Some Types of Liquid Wastes Common in Puerto Rico. | RADIOACTIVE WASTES Radionuclides in Transport in the Columbia River from Pasco to Vancouver, Washington, W73-02022 5B | Reservoir Yield in Arid Regions with Limited Records, W73-02545 2A RANDOM WALK |
| W73-01973 5B Estuaries, Bays and Coastal Currents Around | RADIOACTIVE WELL LOGGING The Sidewall Epithermal Neutron Porosity Log, | A Random-Walk Simulation Model of Alluvial Fan Deposition, W73-02342 2J |
| Puerto Rico, W73-01974 5B | W73-02396 8G RADIOCHEMICAL ANALYSIS | RATE DESIGN Rate Design and Cost of Service, |
| Floods in the Aguadilla-Aguada Area, Northwestern Puerto Rico, W73-02327 7C | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, | W73-02298 6C RATE STRUCTURE Rate Design and Cost of Service, |
| PUGET SOUND Environmental Management for Puget Sound: | W73-02273 5C | W73-02298 6C |
| Certain Problems of Political Organization and Alternative Approaches, W73-02251 6E | RADIOISOTOPES Radioisotope Investigation Techniques in Engineering Geology and Hydrogeology (Radioizotopnyye metody issledovaniya v inz- | RATE STRUCTURES Inventory of Water Diversions and Rate Struc- tures for Cities, Towns, and Villages in New Mexico, |
| PUGET SOUND (WASH.) Hydro-Ecological Problems of Marinas in | henernoy geologii i gidrogeologii), W73-02328 8G | W73-01963 6C |
| Puget Sound, W73-02462 5C | RAINBOW TROUT Effects of Acute Gamma Radiation and Temperature on Growth and Survival of Juvenile | Rate Design and Cost of Service, W73-02298 6C |
| PULP AND PAPER INDUSTRY Great Lakes Adds New Woodroom and Fluid Bed Reactor, | Rainbow Trout (Salmo Gairdneri), W73-02102 5C | REAL TIME RESPONSES Measures of Organic Pollutants in Wastewater |
| W73-02190 5D PULF WASTES | Age, Growth, and Downstream Migration of Juvenile Rainbow Trout (Salmo gairdneri) in a | Treatment Plant Operations, W73-02334 5D |
| Treatment Plant at Virginia Mill. W73-02210 5D | Lake Michigan Tributary, W73-02574 | RECLAIMED WATER On the Use of Reclaimed Wastewaters as a Public Water-Supply Source. |
| Magnesium Bisulfite Recovery Startup, W73-02224 5D | Evaluation of a Winter Steelhead Fishery on a Western Washington River, W73-02575 8I | W73-02141 3C RECOVERY OPERATIONS |
| PUMP TESTING Readers Comment on Step Drawdown Test, W73-02419 8G | Induced Aggregation of Pond-Reared Rainbow Trout (Salmo gairdneri) Through Acoustic Con- ditioning, | Magnesium Bisulfite Recovery Startup, W73-02224 5D RECREATION |
| PUMPAGE TAX A Re-Examination of the Common Pool Problem, | W73-02576 8I RAINFALL-RUNOFF RELATIONSHIPS | Evaluating Recreational Potential of Small Streams, W73-02297 |
| W73-01956 4B PUMPS | A Program for Estimating Runoff from Indiana Watersheds, Part III Analysis of Geomorphologic Data and a Dynamic Con- | Watershed Project Evaluation Involving Multi- ple Social Objectives, |
| Pump Application Engineering, W73-02414 8C | tributing Area Model for Runoff Estimation, W73-01952 2A | W73-02348 6B RECREATION DEMAND |
| PYRENEES MOUNTAINS Ecological Observations on Soldanella Villosa Darracq, | Delay of Runoff from a Glacier Basin, W73-02048 2C | On the Recreational Use of Domestic Water Supply Reservoirs. W73-02132 |
| W73-02217 2I | Representative Rural Catchments in Kenya and Uganda, | The Crisis in Shoreline Recreation, |
| PYRUVATE Relation Between Anaerobic ATP Synthesis from Pyruvate and Nitrogen Fixation in | W73-02050 2A Nonparametric Statistical Methods in Urban Hydrologic Research, | W73-02302 60 RECREATION FACILITIES Dredging and Filling, Cowikeee State Park |
| Azotobacter vinelandii, W73-02475 5C | W73-02175 4C | Lakepoint Resort, Walter F. George Lake |

| Ct. u.tt - Divon Alabama (Desta Paulana | BEGIONAL CHIMPS CHOWNER | NAME OF TAXABLE PARTY AND ADDRESS OF TAXABLE |
|--|--|--|
| Chattahoochee River, Alabama (Draft Environ- | REGIONAL SEWER SYSTEMS | RESEARCH UTILIZATION |
| mental Statement). | Regional Management of Water Supply and | Evaluation of Selected Aspects of Communica- |
| W73-02233 4A | | tion of Water Resources Research Information |
| The Crisis in Shoreline Recreation, | W73-02354 6B | Among University Researchers and Users, |
| | DECEMBER OF STREET | W73-02357 6B |
| W73-02302 - 6G | | RESERVOIR CONSTRUCTION |
| ECREATIONAL FACILITIES | Regional Management of Water Supply and | |
| | Wastewater Disposal Facilities, | Lost Creek Lake Project, Rogue River, Oregon |
| A Study of the Effects of Island Development | W73-02354 6B | (Final Environmental Impact Statement). |
| on Lake Water Quality, | | W73-01989 8D |
| W73-01954 5C | | Whiteoak Dam and Reservoir, Whiteoak Creek |
| ECYCLING | An Experiment in Modeling Rocky Mountain | Basin, Ohio (Draft Environmental Impact |
| Groundwater Recharge and Quality Transfor- | Forest Ecosystems, | Statement). |
| | | W73-01990 8A |
| mations During Initiation and Management of a | | W /3-01330 8A |
| New Stabilization Lagoon, | REGULATION | Curry Creek Reservoir, North Oconee River, |
| W73-02439 5B | Deallie Control, | Georgia (Draft Environmental Impact State- |
| EDRYING | W73-02200 5G | ment). |
| The state of the s | | W73-02523 8A |
| Eco-Physiocloical Studies on Desert Plants: V. | ALIMO I D DELIGITO | 117-0222 |
| Influence of Soaking and Redrying on the Ger- | maniple beattering of Laser Light from Tarola | Clinchfield Dam and Reservoir, Broad River |
| mination of Zygophyllum Coccineum Seeds | ********* | Basin, North Carolina and South Carolina |
| and the Possible Contribution of an Inhibitor to | W73-02181 5B | (Draft Environmental Impact Statement). |
| the Effect, | ALL SALES AND DESCRIPTION OF THE SALES AND DE | W73-02524 8D |
| W73-02093 21 | Water Quality Measurements with Airborne | |
| | Multispectral Scanners, | RESERVOIR LEAKAGE |
| EFUSE ACT OF 1899 | W73-02182 5A | The Asphaltic Lining of Dungonnel Dam, |
| Repair and Protect Our Natural Environment, | | W73-02073 8A |
| W73-01993 6E | Effects of Skylight Polarization, Cloudiness, | |
| A CONTRACTOR OF THE PARTY OF TH | and View Angle on the Detection of Oil on | RESERVOIR OPERATION |
| United States V. Pennsylvania Industria | Water, | Optimization of Water Resources Develop- |
| Chemical Corp. (Defenses to Criminal Prosecu- | W73-02183 5A | ment: Optimization of Capacity Specifications |
| tions under the Refuse Act). | | for Components of Regional, Complex In- |
| W73-02247 6E | Bibliography of Remote Sensing for Planning | tegrated, Multipurpose Water Resources |
| | and Administrative Studies, | Systems, |
| EGIONAL ANALYSIS | W73-02305 7B | W73-01970 6A |
| Power, Pollution, and Public Policy, Issues in | And the Designation of the Control o | |
| Electric Power Production, Shoreline Recrea- | Water Quality Characteristics and Their Mea- | Preliminary Analysis of Surface Water Availa- |
| tion, and Air and Water Pollution Facing New | | bility, |
| England and the Nation. | W73-02427 5A | W73-02544 4A |
| W73-02299 60 | | |
| | Automatic System for Monitoring Water Quali- | RESERVOIR SILTING |
| Regional Government in New England: A | ty, | Sedimentation Characteristics of Gorge-Type |
| Prototype, | W73-02432 5A | Reservoirs, |
| W73-02304 60 | | W73-02179 2J |
| | Proposed Experimental Programs for Testing | |
| Regional Management of Water Supply and | Remote Sensor Applications in the | RESERVOIR STORAGE |
| Wastewater Disposal Facilities, | Metropolitan Washington Area, | Optimum Conjunctive Use of a Dual-Purpose |
| W73-02354 6E | W73-02491 7B | Desalting Plant and Multi-Purpose Surface |
| | | Water Reservoirs, |
| REGIONAL DEVELOPMENT | REPRESENTATIVE CATCHMENTS | W73-02083 3A |
| Economic Analyses of Optimal Water Quality | Representative Rural Catchments in Kenya and | |
| Management, | Uganda. | RESERVOIR YIELD |
| W73-01951 50 | W73-02050 2A | Well Logs in Carbonate Reservoirs, |
| | | W73-02424 4B |
| Revision of Completed Regional or River Basis | RESEARCH AND DEVELOPMENT | |
| Plans, A Policy Statement. | Evaluation of Selected Aspects of Communica- | Reservoir Yield in Arid Regions with Limited |
| W73-01992 6E | tion of Water Resources Research Information | Records, |
| | Among University Researchers and Users, | W73-02545 2A |
| Oneida Shows the Way To Go, | W73-02357 6B | RESERVOIRS |
| W73-02196 5I | | Transition Metals of Impounded Waters, |
| | RESEARCH EQUIPMENT | |
| REGIONAL ECONOMICS | A Simple Apparatus for Measuring Activity | W73-01953 5B |
| Regional Government in New England: | | Hills Creek Reservoir Turbidity Study. |
| Prototype, | W73-01977 5A | W73-02092 5C |
| W73-02304 60 | | |
| Common las alkalis Asiana | RESEARCH PRIORITIES | Modeling and Sensitivity Analysis for Planning |
| REGIONAL GOVERNMENTS | Research Needed on Availability and Develop- | Decisions in Water Resources Expansion, |
| Regional Government in New England: A | ment of Water Supply. | W73-02541 4A |
| Prototype, | W73-02126 6B | |
| W73-02304 6C | | RESERVOIRS (GORGE-TYPE) |
| | On the Use of Reclaimed Wastewaters as a | Sedimentation Characteristics of Gorge-Type |
| REGIONAL PLANNING | Public Water-Supply Source. | Reservoirs, |
| Regional Management of Water Supply and | | W73-02179 2J |
| Wastewater Disposal Facilities, | | |
| W73-02354 6E | Evaluation of Selected Aspects of Communica- | RESINS |
| | tion of Water Resources Research Information | Anion Exchange Equilibria Involving |
| Water Resource Planning. | Among University Researchers and Users, | Phosphate, Sulphate and Chloride, |
| W73-02368 6E | W73-02357 6B | W73-02208 5D |
| | | |

Evalu W73-0

The A W73-0 ROCKY Frost W73-0 ROCKY An E Forest W73-0

ROGUE Lost C (Final W73-0

ROMAN Aquati Bega I W73-0

ROOT S

Charac Role of Specie Upland W73-0

ROTARY How to W73-0

ROUGE Inform of Det Reveal W73-02

ROUTIN Flow I dies, W73-02

RUNOFF Water ship to W73-02

Hydrol tions raschet W73-02

Runoff zaregui uchasti W73-02 Annual ester R rek bas W73-02 RUNOFF

Runoff Isochro zareguli uchastk W73-02

Storm I Ukraine dozhdev Moldav W73-02

RESISTIVITY

| RESISTIVITY Electrical Well Logging Fundamentals, W73-02392 8B | RHODE ISLAND Transfer of Pesticides Through Water, Sediments and Aquatic Life, | RIVER ROUGE FLOOD CONTROL PROJECT River Rouge Flood Control Project, Wayne County, Michigan (Final Environmental Impact |
|--|--|--|
| RESPIRATION | W73-01959 5B | Statement). W73-02270 4A |
| An Estimate of Primary Productivity in a | RHODESIA | PATERIO . |
| Pennsylvania Trout Stream Using a Diurnal | Reservoir Yield in Arid Regions with Limited Records. | An Ecosystematic Study of the South River, |
| Oxygen Curve Technique, W73-02030 5A | W73-02545 2A | Virginia, |
| The second secon | | W73-01972 5C |
| RETAINING WALLS A Theoretical Study of the Pressures Acting on a Rigid Wall by a Sloping Earth or Rock Fill, W73-02077 8D | The Development of Rice Grains Under Con- trolled Environment: II. The Effects of Tem- perature Combined With Air-Humidity and Light Intensity During Ripening on Grain | Storm Runoff Coefficients for Rivers of the Ukraine and Moldavia (Koeffitsiyenty stoka dozhdevykh pavodkov na rekakh Ukrainy i Moldavii), |
| Precast Concrete Should Prove Popular for Crib Walling. | Development, W73-02001 3F | W73-02333 4A |
| W73-02079 8F | 0 | Study of the Thermal Regime of Rivers (Ob izuchenii termicheskogo rezhima rek), |
| RETURN FLOW | Some Important Aspects of the Breeding, Irrigation, and Agrotechniques of Rice, (In Rus- | W73-02336 4A |
| A Hybrid Computer Program for Predicting the | sian). | 21.0 41.2 2.0 2.0 |
| Chemical Quality of Irrigation Return Flows, | W73-02009 3F | Relation of Ice Freezeup Dates and Ice-Cover Duration to Elevation and Channel Slopes of |
| W73-02177 5B | RICE-M | Carpathian Rivers (O svyazi srokov |
| REVERSE-CIRCULATION | Soil Amelioration Conditions in the Akdala Ir- | ustanovleniya i prodoizhitel'nosti ledostava s |
| Place Gravel Pack Properly for Best Results. W73-02416 8B | rigated Massif (On the Example of the Bakh- bakhta Rice Growing Sovkhoz) (In Russian), W73-02184 | vysotoy mestnosti i ukionami na rekakh Kar- pat), W73-02337 4A |
| REVERSE OSMOSIS | 117502104 | N. P. Id C |
| Removal of Toxic Pesticides by Reverse Osmo- sis Water Treatment, | RIGHT-OF-WAY Discon V. Saray, Inc. (Access Rights of Lan- | New Evidence for Spencer's Laurentian River, W73-02505 2H |
| W73-02222 5D | downers Bordering Navigable Canal). | RIVERS AND HARBORS ACT |
| Studies on Reverse Osmosis for Water Pollu- | W73-02237 6E | United States V. Pennsylvania Industrial |
| tion Control, | RIO CULEBRINAS (P R) | Chemical Corp. (Defenses to Criminal Prosecu- tions under the Refuse Act). |
| W73-02225 5D | Floods in the Aguadilla-Aguada Area, | W73-02247 6E |
| REVIEWS | Northwestern Puerto Rico, W73-02327 7C | Company and a start of the contract of the con- |
| Ecological Effects of Offshore Construction, | 17.502521 | RIVERS AND HARBORS FLOOD CONTROL |
| W73-02029 5C | RIPARIAN RIGHTS | ACT OF 1972 Public Works on Rivers and Harbors (Bill |
| Researchers Seek Ways to Lower Costs of Un- | Gregory V. City of New York (Non-Resident Riparian Landowner's for Upstream Diversion | S.4018). W73-02257 6E |
| derground Transmission Systems, | by Municipality). | |
| W73-02074 8C | W73-02239 6E | ROAD CONSTRUCTION |
| Laboratory Methods for the Measurement of Pollutants in Water and Waste Effluents, | Pigorsh V. Fahner (Exclusive Use of Privately Owned Lake). | Spain V. Cape Girardeau (Surface Water Damage Caused by Street Resurfacing). |
| W73-02167 5A | W73-02531 6E | W73-02241 6E |
| Water Quality Measurements with Airborne Multispectral Scanners, W73-02182 5A | RIPPLE MARKS Hydraulic Parameters Controlling Bedform Migration on an Intertidal Sand Body, | A Nomograph Based on Kinematic Wave Theory for Determining Time of Concentration for Overland Flow, W73-02322 8B |
| The Ministry's Memorandum on 'Standards of | W73-02489 2L | |
| Effluents to Rivers With Particular Reference to Industrial Effluents': A Review, W73-02228 | Sedimentary Evidence of Bottom Current Ac- tivity, Strait of Gibraltar Region, W73-02496 2J | Some Effects of Logging and Associated Road Construction on Northern California Streams, W73-02573 4C |
| Company of the contract of the | | ROCK FILL |
| Bibliography of Remote Sensing for Planning and Administrative Studies, W73-02305 7B | RIRIE DAM AND LAKE Ririe Dam and Lake, Willow Creek, Idaho (Draft Environmental Impact Statement). | Evaluation of Properties of Rockfill Materials, W73-02072 8D |
| December 1 Classic 1 1000 | W73-01988 8D | ROCK MECHANICS |
| Research Projects in Glaciology, 1972. W73-02314 2C | RISKS | Fundamentals of Rock Mechanics, W73-02372 8E |
| History of Water Level Gauges, LAKE Erie | A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal | Shear Failure of Anistropic Rocks, |
| and The Niagara River. W73-02493 7C | Water Supply, W73-02540 6A | W73-02374 8E |
| | | A Fracture Criterion for Brittle Anisotropic |
| New Evidence for Spencer's Laurentian River, W73-02505 2H | Procedures for Evaluation of Water and Re- lated Land Resource Projects. | Rock, W73-02397 8E |
| REYNOLDS NUMBER | W73-02271 6G | ROCK WEATHERING |
| Density Stratified, Viscous Flow Past a Flat | | Studies of Saprolite and Its Relation to the |
| Plate, W73-02563 8B | RIVER BASINS Revision of Completed Regional or River Basin | Migration and Occurrence of Groundwater in Crystalline Rocks, |
| | Plans, A Policy Statement. | W73-01955 2F |
| RHINE RIVER (NETH) | W73-01992 6B | ROCKFILL DAMS |
| Contents and Behaviour of Mercury as Compared with Other Heavy Metals in Sediments from the Rivers Rhine and Ems, W73-02158 5B | Modeling and Sensitivity Analysis for Planning Decisions in Water Resources Expansion, W73-02541 4A | ROCKFILL DAMS Ririe Dam and Lake, Willow Creek, Idaho (Draft Environmental Impact Statement). W73-01988 8D |
| | | |

| Evaluation of Properties of Rockfill Materials, W73-02072 8D | Annual Streamflow Fluctuations in the Dni- ester River Basin (Kolebaniya godovogo stoka | SALT BALANCE The Mexican Water Treaty and its Relationship |
|---|---|--|
| | rek basseyna Dnestra), | to Colorado River Water Supplies, |
| The Asphaltic Lining of Dungonnel Dam, | W73-02335 4A | W73-02529 5G |
| W73-02073 8A | RUNOFF VARIABILITY | CALL BOT LIMION |
| ROCKY MOUNTAIN REGION | Annual Streamflow Fluctuations in the Dni- | SALT POLLUTION |
| Frost Cracking in the Colorado Front Range, | ester River Basin (Kolebaniya godovogo stoka | Salt Pollution of Ground Water, W73-02113 5B |
| W73-02043 2C | rek basseyna Dnestra), | W73-02113 5B |
| W 15-02045 | W73-02335 4A | SALTS |
| ROCKY MOUNTAINS | #15-02555 4A | Physical Chemistry of Extraction Processes, |
| An Experiment in Modeling Rocky Mountain | RURAL AREAS | W73-02014 1B |
| Forest Ecosystems, | Water Supply Sources for the Farmstead and | W 73-02014 |
| W73-02566 2A | Rural Home. | Geophysical, Geohydrological, and Geochemi- |
| | W73-02418 4B | cal Reconnaissance of the Luke Salt Body, |
| ROGUE RIVER (OREGON) | | Central Arizona. |
| Lost Creek Lake Project, Rogue River, Oregon | SACRAMENTO RIVER (CALIF) | W73-02480 2F |
| (Final Environmental Impact Statement). | Sacramento River Bank Protection Project, | 14.0 Ltd 200 (1074) |
| W73-01989 8D | California (Draft Environmental Impact State- | SAMPLING |
| | ment). | Techniques for Sampling Benthic Organisms, |
| ROMANIA | W73-02266 8D | W73-02019 7B |
| Aquatic and Marsh Vegetation of the Timis- | | |
| Bega Interfluvial Zone, | SAFE YIELD | Testing for and The Development of Ground |
| W73-02316 4A | Water Table Fluctuations in the Meerut Dis- | Water Supplies, |
| DOOR OVERDAR | trict, Uttar Pradesh, India, | W73-02412 4B |
| ROOT SYSTEMS | W73-02044 4B | |
| Characteristics of Structure and Antierosive | | Automatic System for Monitoring Water Quali- |
| Role of Root Systems of Woody and Shrub | SAGITTA ENFLATA | ty, |
| Species in Eroded Lands of the Volyn-Podolian | The Hydrological Conditions for the Entry of | W73-02432 5A |
| Upland (In Russian), | Sagitta Enflata Into Osaka Bay: II. In The Case | Matheda for Ossais Besticides in Water and |
| W73-02055 2I | of Appearance of a Cold Water Mass (In | Methods for Organic Pesticides in Water and |
| ROTARY DRILLING | Japanese), | Wastewater. |
| | W73-02587 2L | W73-02436 5A |
| How to Dull a Bit for Fun and Profit, | CARDIN CARRIEDING COURT GARA | Diving Techniques Used in the Study of Fer- |
| W73-02387 8G | SAINT CATHERINE SOUND (MD) | romanganese Nodule Deposits, |
| ROUGE RIVER (MICH) | Saint Catherine Sound, Maryland (Maintenance | W73-02513 2H |
| | Dredging) (Final Environmental Impact State- | W 15-02515 |
| Information on the Velocity and Flow Pattern | ment). | SAN ANTONIO AREA (TEX) |
| of Detroit River Water in Western Lake Erie | W73-02516 4A | Chemical Analyses of Water From Observation |
| Revealed by an Accidental Salt Spill, W73-02057 5B | SALINE WATER | Wells in the Edwards and Associated |
| W73-02057 5B | | Limestones, San Antonio Area, Texas, 1967. |
| ROUTING | The Mexican Water Treaty and its Relationship | W73-02307 2K |
| Flow Routing Models for Stream System Stu- | to Colorado River Water Supplies, W73-02529 5G | W 75-02507 |
| dies, | W/3-02329 3G | Records of Precipitation, Aquifer Head, and |
| W73-02176 2E | SALINE WATER INTRUSION | Ground-Water Recharge to the Edwards and |
| W/3-021/0 | Salt Pollution of Ground Water, | Associated Limestones, San Antonio Area, |
| RUNOFF | W73-02113 5B | Texas,-1968. |
| Water Quality of Hyrum Lake and Its Relation- | W15-02115 | W73-02308 2F |
| ship to Algal Blooms, | SALINITY | The state of the s |
| W73-02121 5C | Optical Signatures of the Near-Shore Waters of | SAN BERNARDINO COUNTY (CALIF) |
| 30 | Southern Monterey Bay, | Lytle and Warm Creeks, San Bernardino Coun- |
| Hydrologic Investigations and Flow Computa- | W73-02027 5A | ty, California (Final Environmental Impact |
| tions (Gidrologicheskiye isaledovaniya i | W15-02021 | Statement). |
| raschety stoka). | Computing Salinity Profiles in Ice, | W73-01987 8A |
| W73-02330 4A | W73-02054 2C | |
| | | SAND AQUIFERS |
| Runoff Coefficients for Areas Between | Salt Pollution of Ground Water, | Filtrate Invasion in Highly Permeable Sands, |
| Isochrones (O koeffitsiyentakh yestestvennogo | W73-02113 5B | W73-02422 8E |
| zaregulirovaniya stoka na mezhizokhronnykh | | |
| uchastkakh), | Effects of Handling and Salinity on Oxygen | SAND BARS |
| W73-02331 4A | Requirements of the Striped Bass, Morone | Bedforms of the Tana River, Norway, |
| | Saxatilis, | W73-02047 20 |
| Annual Streamflow Fluctuations in the Dni- | W73-02435 5C | CAND CONTROL |
| ester River Basin (Kolebaniya godovogo stoka | | SAND CONTROL |
| rek basseyna Dnestra), | Salinity-Related Polymorphism in the Brackish- | Judging Proper Gravel-Pack Thickness. |
| W73-02335 / 4A | Water Diatom Cyclotella Cryptica, | W73-02108 8E |
| RUNOFF COEFFICIENT | W73-02548 5C | Development Work is Essential. |
| | SALMON | |
| Runoff Coefficients for Areas Between | | W73-02110 8E |
| Isochrones (O koeffitsiyentakh yestestvennogo | Some Effects of Logging and Associated Road Construction on Northern California Streams, | SANDS |
| zaregulirovaniya stoka na mezhizokhronnykh | | Some Sedimentological Aspects of the Flu- |
| uchastkakh), | W73-02573 4C | vioglacial Outwash Plain Near Soesterberg |
| W73-02331 4A | SALMON EGGS | (The Netherlands), |
| Storm Runoff Coefficients for Rivers of the | Aspects of the Characterization, Identification, | (The Netherlands), W73-02159 |
| Ukraine and Moldavia (Koeffitsiyenty stoka | and Ecology of the Bacterial Flora Associated | 11 / 3-02139 |
| dozhdevykh pavodkov na rekakh Ukrainy i | with the Surface of Stream-Incubating Pacific | SANDSTONE RESERVOIRS |
| Moldavii), | Salmon (Oncorhynchus) Eggs, | Log Interpretations in Sandstone Reservoirs, |
| W73-02333 4A | W73-02565 8I | W73-02423 4E |

SANDSTONES

| ANDSTONES | Log Interpretations in Sandstone Reservoirs. | Sediment Control, W73-02200 5G |
|--|--|--|
| Yields of Deep Sandstone Wells in orthern Il- | W73-02423 4B | W 73-02200 |
| linois, W73-02386 3B | # 13-02-25 | SEDIMENT LOAD |
| W /3-02380 | SCALING | A Source Study of the Suspended Solids in the |
| The Use of Acoustic Logs in the Evaluation of | Secondary Deposition of Iron Compounds Fol- | Gallatin River, W73-02559 5B |
| Sandstone Reservoirs, W73-02401 8G | lowing Acidizing Treatments, W73-02420 8G | W 13-02339 |
| W73-02401 8G | #15-02-20 | SEDIMENT TRANSPORT |
| Log Interpretations in Sandstone Reservoirs, | SCANNER IMAGERY | Sediment Yields of Wisconsin Streams, |
| W73-02423 4B | Water Quality Measurements with Airborne | W73-02152 7C |
| | Multispectral Scanners, | The Francisco Distribution of the Comment |
| ANDUSKY (OHIO) | W73-02182 5A | The Frequency Distribution of the Current Speed at the Netherlands Lightvessels and Its |
| Chemical and Sediment Movement from Agricultural Land into Lake Brie, | SCOTLAND | Possible Influence on the Composition of Sedi- |
| W73-01957 5B | The Evolution of Coastal Sand Dunes, | ments in the Southern North Sea, |
| W13-01551 | W73-02035 2J | W73-02155 2J |
| ANDY HOOK BAY (N.J.) | | |
| Zooplankton of the Sandy Bay Area, N.J., | SCREENING | Tentative Data on Flow Resistance in Suspen- |
| W73-02448 5C | Kenosha Increases Plant Capacity with Micros- | sion Currents, |
| ANDY SOIL | trainers, W73-02426 5F | W73-02156 2J |
| Contribution to the Study of Nitrogen Leaching | W/3-02426 3F | Sedimentation Characteristics of Gorge-Type |
| in a Sandy Soil ('Dior') in Senegal, | SCUBA DIVING | Reservoirs, |
| W73-02161 5G | Diving Techniques Used in the Study of Fer- | W73-02179 2J |
| 30 | romanganese Nodule Deposits, | 10 10 1 1 1 1 1 1 1 1 |
| SANITARY ENGINEERING | W73-02513 2H | A General Stochastic Model for the Transport |
| Pollution of Subsurface Water by Sanitary | SKA FLOOR | of Sediment Bed Material, W73-02315 2J |
| Landfills. Vol 2, | Sound Attenuation in Marine Sediments, | W /3-02313 |
| W73-02106 5B | W73-02467 2J | Hydraulic Parameters Controlling Bedform |
| Pollution of Surface Water by Sanitary Land- | | Migration on an Intertidal Sand Body, |
| fills. Vol 3. | SEA ICE | W73-02489 2L |
| W73-02107 5B | Circulation and Hydrology Under the Seasonal | |
| | Ice in McMurdo Sound, Antarctica, | SEDIMENT YIELD |
| SANITARY LANDFILLS | W73-02051 2C | Sediment Yields of Wisconsin Streams, W73-02152 7C |
| Pollution of Subsurface Water by Sanitary | On the Use of Stable Isotopes to Trace the | W 73-02132 |
| Landfills. Vol 2, | Origins of Ice in a Floating Ice Tongue, | SEDIMENTARY STRUCTURES |
| W73-02106 5B | W73-02168 2C | Sedimentary Evidence of Bottom Current Ac- |
| Pollution of Surface Water by Sanitary Land- | | tivity, Strait of Gibraltar Region, |
| fills. Vol 3. | Model of Pressure Ridge Formation in Sea Ice, | W73-02496 2J |
| W73-02107 5B | W73-02172 2C | SEDIMENTATION |
| | SEA WATER | Sedimentation Characteristics of Gorge-Type |
| SANITARY PRACTICES | Release of Dissolved Organic Matter by Marine | Reservoirs, |
| Water wells and Ground Water Contamination, | Macrophytes, | W73-02179 2J |
| W73-02413 5B | W73-02100 5C | |
| SANTA ANA RIVER BASIN (CALIF) | | Sediment Control, |
| Water Economics, | Diffusivity of Suspended Matter in the Carib- | W73-02200 5G |
| W73-02543 4B | bean Sea, W73-02171 2J | Practical Experience in the use of Polyelec- |
| conditional day done as a second | W/3-021/1 | trolytes. |
| SANTA CLARA RIVER (CALIF) | The Adhesive Properties of Chlorella Vulgaris, | W73-02203 5D |
| Newhall, Saugus and Vicinity, Los Angeles | and the Enhancement of This Adhesion by | Little and the contract of the |
| County, Santa Clara River and Tributaries, | Substances Found in Ambient Sea Water, | A Random-Walk Simulation Model of Alluvial |
| California (Draft Environmental Impact State- ment). | W73-02470 5C | Fan Deposition, |
| W73-02521 8A | SEALING | W73-02342 2J |
| 0.1 | Seismic Borehole Plug, | Morphology and Recent Sediments of the |
| SANTA ROSA (CALIFORNIA) | W73-02384 8C | Western Alboran Basin in the Mediterranean |
| (Santa Rosa, Sonoma County, California, | | Sea, |
| Sewer Collection and Water Distribution | Well Grouting and Well Protection, | W73-02494 2J |
| System), (Draft Environmental Impact State- | W73-02408 8F | OUDTH PRIMOT OUT |
| ment). W73-01996 3D | SEASONAL | A Contribution to the Sedimentary Petrological |
| W /3-01770 3D | Transition Metals of Impounded Waters, | Description of the Maas Deposits in Southern |
| SAPROLITES | W73-01953 5B | Limburg (The Netherlands), |
| Studies of Saprolite and Its Relation to the | 1.70.198 | W73-02153 2J |
| Migration and Occurrence of Groundwater in | SEDIMENT CHARACTERISTICS | The state of the s |
| Crystalline Rocks, | Characteristics of Estuarine Sediments of the | Tidal Deposits and Their Sedimentary Struc- |
| W73-01955 2F | United States, | tures, |
| SATELLITES (ARTIFICIAL) | W73-02481 2L | W73-02154 2L |
| Hydrologic Data Collection Via Geostationary | SEDIMENT CONTROL | Recent Sediments of the Central California |
| Satellite, | Sediment Control, | Continental ShelfPillar Point to Pigeon Point: |
| W73-02036 7A | W73-02200 5G | Part B. Mineralogical Data, |
| | leading the state of the second transfer of the second state of th | W73-02319 2J |
| Proposed Experimental Programs for Testing | SEDIMENT DISCHARGE | Characteristics of Participation Co. Co. |
| Remote Sensor Applications in the | Chemical and Sediment Movement from | Characteristics of Estuarine Sediments of the United States. |
| Metropolitan Washington Area, W73-02491 7B | Agricultural Land into Lake Erie, W73-01957 5B | W73-02481 2L |
| 1D | | |

Laid Moo W77

Skiddin Oxi ocen Sedde W77

A S as B W77

Cha Unit W77

Divi rom W77

A S Gall W77

SEDIM W77

SEDIM W77

SEZIM W73

SENEG Contin a S W73-SENES The IV. T W73-The II. G W73-The III. N

| Lake Erie Nearshore Sediments-Fort Erie to Mohawk Point, Ontario, | SENSITIVITY ANALYSIS Modeling and Sensitivity Analysis for Planning | The Eyes of Texas Are on U.S. Gypsum, W73-02226 |
|--|--|--|
| W73-02504 2H | Decisions in Water Resources Expansion, | The state of the s |
| REDIMENTS | W73-02541 4A | SEWAGE TREATMENT PLANTS Measures of Organic Pollutants in Wastewate |
| Oxidation-Reduction Potentials, Oxygen Con- | SEPARATION TECHNIQUES | Treatment Plant Operations, |
| centration and Oxygen Uptake of Profundal Sediments in a Eutrophic Lake, | Physical Chemistry of Extraction Processes, W73-02014 | W73-02334 SI |
| W73-02451 5C | AMOUNT TO THE REAL PROPERTY OF THE PROPERTY OF | SEWER SURCHARGE |
| A Study of Sediments from Bellingham Harbor | Automated Separations in Routine Activation | Sewer Surcharges and Their Effect on Water Use, |
| as Related to Marine Disposal, | Analysis of Mercury, W73-02015 5A | W73-02295 50 |
| W73-02461 5C | Trace-Quantity Engineering, | SEWERAGE |
| Sound Attenuation in Marine Sediments, W73-02467 2J | W73-02028 5A | Sewer Surcharges and Their Effect on Water Use, |
| | Effects of Long Chain Polymers on the Size | W73-02295 50 |
| Characteristics of Estuarine Sediments of the United States. | Distribution of Oil-In-Water Emulsions, W73-02120 5G | SEWERS |
| W73-02481 2L | | (Santa Rosa, Sonoma County, California |
| Diving Techniques Used in the Study of Fer- | Separation of Lignin from Aqueous Solution by Adsorptive Bubble Separation Processes, | Sewer Collection and Water Distribution System), (Draft Environmental Impact State |
| romanganese Nodule Deposits, | W73-02350 5D | ment). |
| W73-02513 2H | SEQUESTERING AGENTS | W73-01996 31 |
| A Source Study of the Suspended Solids in the Gallatin River, | Secondary Depostion of Iron Compounds Fol- lowing Acidizing Treatments, | Oneida Shows the Way To Go, W73-02196 |
| W73-02559 5B | W73-02420 8G | |
| SEDIMENTS (SUSPENDED) | OPPOPULATION OF THE PROPERTY O | Regional Management of Water Supply and Wastewater Disposal Facilities, |
| Suspended Sediment Discharge of the | Rate of Settlement Under Two- and Three- | W73-02354 6 |
| Susquehanna River at Conowingo, Maryland, During 1969. | Dimensional Conditions, W73-02075 8D | SHEAR STRESS |
| W73-02445 2J | #13-02013 | Shear Failure of Anistropic Rocks, |
| SEED ROCKS | SETTLING BASINS | W73-02374 8 |
| Pollution and the Ecology of Nearshore | High Rate Filtration in Fairfax County, Vir- | SHELLFISH |
| Periphyton of Lake Superior: The Effects of Calefaction on Periphyton, | W73-02146 5F | The West Falmouth Oil Spill. Data Available i 1971. II. Chemistry, |
| W73-02556 5C | SEWAGE | W73-02024 5 |
| The state of the s | Investigations on the Loading of the Untertrave | SHIPS |
| SEEPAGE Groundwater Recharge and Quality Transfor- | with Sewage, (In German), W73-02016 5C | Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclea |
| mations During Initiation of a New Sewage Sta- bilization Pond (and Management), | Fisheries, Cooling-Water Discharges and | Powered Ships and Their Support Facilities, |
| W73-02438 5B | Sewage and Industrial Wastes, | W73-01982 5 |
| CONTRACT PROPERTY. | W73-02433 5C | SHOOTING (BLASTING) |
| SEISMIC PROFILING Seismic Profiling and Geology of the Toronto | SEWAGE EFFLUENT | Yields of Deep Sandstone Wells in orthern I |
| Waterfront Area of Lake Ontario, | Groundwater Recharge and Quality Transfor- | linois, W73-02386 3 |
| W73-02501 2H | mations During Initiation and Management of a | |
| SEISMIC STUDIES | New Stabilization Lagoon, W73-02439 5B | SHORE PROTECTION |
| Seismic Profiling and Geology of the Toronto | | National Shoreline Study, Regional Inventor Report, North Atlantic Region. |
| Waterfront Area of Lake Ontario, | SEWAGE EFFLUENTS Optical Signatures of the Near-Shore Waters of | W73-02186 8 |
| W73-02501 2H | Southern Monterey Bay, | Hamlin Beach State Park Cooperative Beach |
| SELF-SEALING PACKERS | W73-02027 5A | Erosion Control Project, Lake Ontario, Mo |
| Procedures for Installing Well Screens. W73-02415 8A | The Ministry's Memorandum on 'Standards of | roe County, New York (Draft Environment Impact Statement). |
| | Effluents to Rivers With Particular Reference | W73-02261 8 |
| SEMIARID CLIMATES Water for the West, | to Industrial Effluents': A Review, W73-02228 5G | |
| W73-02129 6D | | Hawaii Regional Inventory of the Nation Shoreline Study. |
| place find of reducti | SEWAGE INFLOWS | W73-02321 8 |
| SENEGAL Contribution to the Study of Nitrogen Leaching | Comparative Investigations on the Benthic Fauna at Two Sewage Inflows of Lake | SHORELAND MANAGEMENT |
| in a Sandy Soil ('Dior') in Senegal, W73-02161 5G | Balaton, W73-02595 5C | Effects of Institutional Constraints ar |
| | | Resources Planning on Growth in and Ne Estuaries, |
| SENESCENCE | SEWAGE OUTFALL PIPE | W73-02465 |
| The Influence of Mist Irrigation on the Potato IV. Tuber Quality Factors, | Polyethylene Pipe Used for 36-In Sewage Out- fall. | SHORELINES |
| W73-01968 3F | W73-02188 5D | The Crisis in Shoreline Recreation, |
| The Influence of Mist Irrigation on the Potato: | SEWAGE TREATMENT | W73-02302 |
| II. Growth and Development, | Oneida Shows the Way To Go, | SHORES |
| W73-02441 3F | W73-02196 5D | The Drive To Save America's Shorelines. |
| The Influence of Mist Irrigation on the Potato: | Simulation of the Mean Performance of Mu- | W73-02248 |
| III. Nutrient Content of Leaves, | nicipal Waste Treatment Plants, | The Crisis in Shoreline Recreation, |
| W73-02442 3F | W73-02212 5D | W73-02302 |

SODIU Effe

SODIU Effe Chio (In R W73

SOIGN The I W73-SOIL A Soil rigate bakh

SOIL A Soil Irriga W73-SOIL C A So Galla W73-

SOIL C Irriga W73-

SOIL C Boxe and State W73-

Sunri Preve Impa W73-SOIL E Soil (Eroz 2.). W73-Meth Poten Russi W73-4

Erosi W73-

SOIL M Chang Maize Czech W73-4

SOIL PI Effec Mech W73-0

SOIL W

SOIL-W

The I Decre W73-0

| SHORES | | |
|--|--|--|
| Seismic Profiling and Geology of the Toronto | Water and Sewage Sludge Absorption by Solid | SNOW CRYSTALS |
| Waterfront Area of Lake Ontario, W73-02501 2H | Waste, W73-02191 5D | Snow Structure and Snow Regime of the West Siberian Taiga (Struktura i rezhim snezhnov |
| 117702001 | The second of th | tolshchi zapadmosibirskoy taygi), |
| The Coastal Boundary Layers of a Lake, W73-02508 2H | Water Quality Improvement in Boston Harbor, W73-02303 6G | W73-02063 2C |
| Transport in the Baroclinic Coastal Current | OF FIRST REVINO | SNOW PROPERTIES Snow Structure and Snow Regime of the West |
| Near the South Shore of Lake Ontario in Early Summer. | SLUDGE DRYING Treatment of Waste Sludges from Water Purifi- | Siberian Taiga (Struktura i rezhim snezhnoy tolshchi zapadmosibirskoy taygi), |
| W73-02510 2H | cation Plants, W73-01964 5F | W73-02063 2C |
| SHRIMP | SLUDGE FILTRATION | SNOWFALL |
| DDT Residues in Coastal Marine Phytoplank- ton and Their Transfer in Pelagic Food Chains, | Treatment of Waste Sludges from Water Purifi- | Design, Execution, and Results of a Mesoscale Snowstorm Modification Project, |
| W73-02105 5C | cation Plants, W73-01964 5F | W73-02483 2C |
| SHRUBS | W15-015-04 | SNOWMELT |
| The Effect of Soil and Hydrological Conditions | SLUDGE TREATMENT | Meltwater Gaging Program Project No 1, Ap- |
| on the Settlement and Productivity of Tree and Shrub Vegetation of Don River Floodplain, (In | Treatment of Waste Sludges from Water Purifi- cation Plants, | proach Roads, Tuto Area, Greenland. W73-02486 2C |
| Russian), | W73-01964 5F | |
| W73-02199 4A SIBERIA | Mechanisms of Change in Activated Sludge De- | SNOWPACK WATER CONTENT (MAINE) Average Water Content of Snowpack in Maine, |
| Bibliography on the Hydrogeology of Siberia | waterability During Aerobic Digestion, | W73-02326 7C |
| and the Soviet Far East for the Period 1918- | W73-02362 5D | SNOWPACKS |
| 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | SLURRIES | Snow Structure and Snow Regime of the West |
| Bibliograficheskiy ukazatel'. 1918-1965), W73-02058 2F | Well Grouting and Well Protection, | Siberian Taiga (Struktura i rezhim snezhnoy |
| A STATE OF THE PARTY OF THE PAR | W73-02408 8F | tolshchi zapadmosibirskoy taygi), W73-02063 2C |
| SILTS | SMALL WATERSHEDS | |
| A Source Study of the Suspended Solids in the Gallatin River, | A Program for Estimating Runoff from Indiana | Average Water Content of Snowpack in Maine, |
| W73-02559 5B | Watersheds, Part III Analysis of | W73-02326 7C |
| | Geomorphologic Data and a Dynamic Con- | SOAKING |
| SIMULATION ANALYSIS A Hybrid Computer Program for Predicting the Chemical Quality of Irrigation Return Flows, | tributing Area Model for Runoff Estimation, W73-01952 2A | Eco-Physiocloical Studies on Desert Plants: V. Influence of Soaking and Redrying on the Ger- |
| W73-02177 5B | Formation and Calculation of Elements of the | mination of Zygophyllum Coccineum Seeds and the Possible Contribution of an Inhibitor to |
| Simulation of the Mean Performance of Mu- | Water Balance for Small Watersheds of | the Effect, |
| nicipal Waste Treatment Plants, | Northern Kazakhstan (Formirovaniye i raschety elementov vodnogo balansa malykh | W73-02093 21 |
| W73-02212 5D | vodosborov Severnogo Kazakhstana). | SOCIAL ASPECTS |
| A Random-Walk Simulation Model of Alluvial | W73-02065 2A | Watershed Project Evaluation Involving Multi- |
| Fan Deposition, | Watershed Project Evaluation Involving Multi- | ple Social Objectives, W73-02348 6B |
| W73-02342 2J | ple Social Objectives, | |
| Field Mapping and Computer Simulation of | W73-02348 6B | SOCIAL IMPACT Up and Down with EcologyThe 'Issue-Atten- |
| Braided-Stream Networks, W73-02490 2J | SNAILS | tion Cycle', |
| | The Molluscicide Action of Thiol Reagents (Die | W73-02259 6G |
| Reservoir Yield in Arid Regions with Limited | Molluscizide Wirkung Von Thiol-Reagentien), | SOCIAL PARTICIPATION |
| Records, W73-02545 2A | W73-02275 5C | Up and Down with EcologyThe 'Issue-Atten- |
| | SNAP BEAN PODS | tion Cycle', |
| SIMULATION STUDIES | A Study of the Effects of Mist Irrigation on the | W73-02259 6G |
| Simulation Studies of the Adams River Sockeye Salmon (Oncorhynchus nerka), | Potato (Solanum tuberosum L.) and the Snap Bean (Phaseolus vulgaris L.), | Evaluation of Selected Aspects of Communica- tion of Water Resources Research Information |
| W73-02580 8I | W73-01967 3F | Among University Researchers and Users, |
| SINGLE-POINT RESISTANCE | | W73-02357 6B |
| Electrical Well Logging Fundamentals, | SNOW | Ways in Which a Resident of the Madison |
| W73-02392 8B | Engineering Glaciology (Inzhenernaya glyat- siologiya). | Lakes' Watershed may Help to Improve Water |
| SLOPE FAILURES | W73-02060 2C | Quality in the Lakes, W73-02479 5C |
| Investigation of Slope Failures in the Idaho Batholith, | Snow Structure and Snow Regime of the West | |
| W73-02564 2J | Siberian Taiga (Struktura i rezhim snezhnoy | SOCKEYE SALMON Growth Responses of Young Sockeye Salmon |
| SLUDGE | tolshchi zapadmosibirskoy taygi), | (Oncorhynchus nerka) to Different Diets and |
| Water Quality Improvement in Boston Harbor, | W73-02063 2C | Planes of Nutrition, |
| W73-02303 6G | Summary of Current Research on Snow and | W73-02571 8I |
| SLUDGE DIGESTION | Ice in Canada. | Simulation Studies of the Adams River |
| Vienna-Blumental Sewage Treatment Plant, | W73-02310 2C | Sockeye Salmon (Oncorhynchus nerka), |
| W73-02197 5D | The second secon | W73-02580 8I |

W73-02197

SLUDGE DISPOSAL

Treatment of Waste Sludges from Water Purifi-cation Plants, W73-01964 5F

5D

5F

SNOW COVER

Snow Structure and Snow Regime of the West Siberian Taiga (Struktura i rezhim snezhnoy tolshchi zapadmosibirskoy taygi), W73-02063 2C

SOCORRO COUNTY

Soil Associations and Land Classification for Irrigation, Socorro County, W73-02117 3F

| Effects of Temperature on Osmotic and Ionic | Soil Erosion and Channel Processes. No. 2. | Comparison of Benthic Infaunal Abundance on |
|--|---|--|
| Regulation in Goldfish, | (Eroziya pochv i ruslovyye protsessy. Vypusk | Two Abyssal Plains in the Northeast Pacific |
| W73-02103 5C | 2.). | Ocean with Comments on Deep-Sea Food |
| SODIUM CHLORIDE WATER | W73-02062 2J | Sources, |
| Effect of Drinking Water with Different | Erosion and Deflation of Soils (In Russian), | W73-02017 5A |
| Chloride Contents on Experimental Animals, | W73-02163 2J | SPECIFIC CAPACITY |
| (In Russian), | | Yields of Deep Sandstone Wells in orthern Il- |
| W73-02020 5C | Algal Nitrogen Fixation in Temperate Regions, | linois, |
| | W73-02471 5C | W73-02386 3B |
| SOIGNES FOREST | SOLAR RADIATION | A New Approach for Estimating Transmissi- |
| The Ponds of the Soignes Forest, W73-02593 4A | Solar Radiation Absorption by Leafless Hard- | bility From Specific Capacity, |
| W 13-02393 4A | wood Forests, | W73-02398 8B |
| SOIL AMELIORATION | W73-02569 2I | As Park, Mr. (Bostlett & Associated Associat |
| Soil Amelioration Conditions in the Akdala Ir- | Discourse to Faculty of the period of | SPECTROCHEMICAL ANALYSIS |
| rigated Massif (On the Example of the Bakh- | SOLDANELLA VILLOSA D | Advances in Analytical Chemistry and Instru- |
| bakhta Rice Growing Sovkhoz) (In Russian), | Ecological Observations on Soldanella Villosa | mentation. Volume 9 - Spectrochemical Methods of Analysis. |
| W73-02184 3F | Darracq, W73-02217 2I | W73-02096 5A |
| SOIL ASSOCIATIONS | 475-02217 | 1175 02050 |
| Soil Associations and Land Classification for | SOLUBILITY | SPECTROSCOPY |
| Irrigation, Socorro County, | Structural Aspects of Amide-Water Systems, | Time Stability of Aqueous APDC and Its Man- |
| W73-02117 3F | W73-02343 5A | ganese and Nickel Complexes in MIBK, |
| ACRE CHINESIAN II | COLUMN DAMP & CALONIC | W73-02320 2K |
| SOIL CHEMISTRY | SOLVENT EXTRACTIONS Physical Chemistry of Extraction Processes, | SPLIT PLOT DESIGN |
| A Source Study of the Suspended Solids in the Gallatin River, | W73-02014 1B | The Influence of Mist Irrigation on the Potato |
| W73-02559 5B | 115 | IV. Tuber Quality Factors, |
| 75 | SONIC VELOCITY | W73-01968 3F |
| SOIL CLASSIFICATION | The Use of Acoustic Logs in the Evaluation of | The Influence of Mist Industion on the Betster |
| Soil Associations and Land Classification for | Sandstone Reservoirs, | The Influence of Mist Irrigation on the Potato: II. Growth and Development, |
| Irrigation, Socorro County, | W73-02401 8G | W73-02441 3F |
| W73-02117 3F | SORPTION | |
| SOIL CONSERVATION | Phenol Sorption by Activated Carbon and | SPOIL BANKS |
| Boxelder Creek Watershed Project, Colorado | Selected Macroporous Resins, | Miami Harbor, Florida, Navigation (Final En- |
| and Wyoming (Final Environmental Impact | W73-02206 5D | vironmental Impact Statement). |
| Statement). | | W73-02517 8A |
| W73-02235 4D | SORPTION ENERGY Phenol Sorption by Activated Carbon and | SPONTANEOUS POTENTIAL |
| Sunrise Subwatershed, Little Sioux Flood | Selected Macroporous Resins, | Electrical Well Logging Fundamentals, |
| Prevention Project, Iowa (Draft Environmental | W73-02206 5D | W73-02392 8B |
| Impact Statement). | 35 | SPRAY SYSTEMS |
| W73-02263 4D | SORTING | Concentration of Brines by Spray Evaporation, |
| Total de la contrata del la contrata de la contrata del la contrata de la contrata del la contrata de la contrata del la c | A Simple Device for the Sorting of Living | W73-02081 SE |
| SOIL EROSION | Planktonic Copepods, W73-02598 7B | |
| Soil Erosion and Channel Processes. No. 2. (Eroziya pochv i ruslovyye protsessy. Vypusk | W/3-02398 /B | SPRINGFIELD (MASS) |
| 2.). | SOUND WAVES | Surface Waters of a Small City (Springfield, |
| W73-02062 2J | Sound Attenuation in Marine Sediments, | Mass), W73-01961 6G |
| | W73-02467 2J | W/3-01901 |
| Methods of Relief Studies for Evaluation of the | ACTURE LEBECL | SQUEEZE CEMENTING |
| Potential Danger of Water Erosion of Soils (In | SOUTH AFRICA Reservoir Yield in Arid Regions with Limited | A Proven Squeeze-Cementing Technique in a |
| Russian), | Records, | Dolomite Reservoir, |
| W73-02128 2J | W73-02545 2A | W73-02421 8F |
| Erosion and Deflation of Soils (In Russian), | | ST. LAWRENCE GULF |
| W73-02163 2J | SOUTH CAROLINA | Quantitative Fluctuations in the Zooplankton of |
| | Standing Crops of Elements and Atomic Ratios | the Baie-Des-Chaleurs (Saint-Lawrence Gulf): |
| SOIL MOISTURE | in a Small Mammal Community, W73-02584 5A | III. Fluctuations in Copepods Other Than |
| Changes of Soil Moisture Under Lucerne and Maize Stands Grown for Green Mass (In | W73-02584 5A | Calanus, |
| Czech). | SOUTH RIVER (VA) | W73-02570 2L |
| W73-02142 2G | An Ecosystematic Study of the South River, | ST. LAWRENCE SEAWAY |
| | Virginia, | Great Lakes Basin Commission Challenges for |
| SOIL PROPERTIES | W73-01972 5C | the Future. An Interim Report on the Great |
| Effect of Polymer Fertilizers on the Structural- | SOUTH TAHOE PUD | Lakes Basin Framework Study. |
| Mechanical Properties of Soil (In Russian), W73-02140 | Filtration Boasts Tertiary Treatment, Mixed- | W73-02291 6B |
| W73-02140 2G | Media Filters, Plus Filter Aids, Turn in a Top | STABLE ISOTOPES |
| SOIL WATER | Performance, | On the Use of Stable Isotopes to Trace the |
| The Response of Root and Shoot Growth to | W73-02229 5D | Origins of Ice in a Floating Ice Tongue, |
| Decreases in Soil Water Potential, | | W73-02168 2C |
| W73-02558 2I | SOVIET FAR EAST | |
| COIL WATER DE ANT DEL AMONOMINO | Bibliography on the Hydrogeology of Siberia | STANDARDS Some Studies on the Chronic Toxicity of Cod- |
| SOIL-WATER-PLANT RELATIONSHIPS The Response of Root and Shoot Growth to | and the Soviet Far East for the Period 1918- 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | Some Studies on the Chronic Toxicity of Cad- mium and Hexavalent Chromium in Drinking |
| Decreases in Soil Water Potential, | Bibliograficheskiy ukazatel'. 1918-1965), | Water, |
| W73-02558 21 | W73-02058 2F | W73-02428 5C |
| | | |

SULF The Mo W7

SULP Mic W7

SUMN Tra Nea Sun W7:

SUNN Mili Car men W7:

SURC The of I Indu W7:

SURC Use The W73 Sew W73

The Trea Lev W73

SURF Edg W73

Effe W73

SURFA McC for A W73

Reu tion W73

Inve Stor issle livne W73

SURFA Wat Rura W73

SURFA Wate 2. W W73

Inde tobe W73

Wate W73

| STATIONS | ic Data for Urban Studies in the Fort Worth, | New York for the Flood of June 1972, |
|---|--|--|
| Index of Surface Water Stations in Texas, Oc- | Texas, Metropolitan Area, 1970, | W73-02492 2E |
| tober 1972. | W73-02482 7C | de solida de sol |
| W73-02311 7C | W 13-02402 | STREAMFLOW FORECASTING |
| STATISTICAL METHODS | STORMS | Flow Routing Models for Stream System Stu- |
| | Design, Execution, and Results of a Mesoscale | dies, |
| A Method of Mathematical Modeling of Com- | Snowstorm Modification Project, | W73-02176 2E |
| plex Ecological Systems, | W73-02483 2C | A STATE OF THE PARTY OF THE PAR |
| W73-02032 5B | 117-02405 | Serial-Correlation Structure of Discretized |
| Nonparametric Statistical Methods in Urban | STRAIN | Streamflow, |
| Hydrologic Research, | Fundamentals of Rock Mechanics, | W73-02323 2E |
| W73-02175 4C | W73-02372 8E | |
| W13-02113 | | STREAMS |
| STATISTICAL METHODS (NONPARAMETRIC) | STRAINING | Proposed Reclassifications of Certain Waters in |
| Nonparametric Statistical Methods in Urban | Kenosha Increases Plant Capacity with Micros- | the Cape Fear, Lumber, and Yadkin-Pee Dee |
| Hydrologic Research, | trainers, | River Basins to be Considered at a Public Hear- |
| W73-02175 4C | W73-02426 5F | ing to be Held on November 2, 1972, in |
| W/3-021/3 | | Southern Pines, North Carolina. |
| STEEL | STRAITS | W73-01983 5G |
| Regeneration of Steelworks Hydrochloric Acid | Sedimentary Evidence of Bottom Current Ac- | |
| Pickle Liquor, | tivity, Strait of Gibraltar Region, | Sediment Yields of Wisconsin Streams, |
| W73-02198 5D | W73-02496 2J | W73-02152 7C |
| 117-02170 | | to the control of the |
| STEP-DRAWDOWN TEST | STRAITS OF GIBRALTAR | Evaluating Recreational Potential of Small |
| Readers Comment on Step Drawdown Test, | Sedimentary Evidence of Bottom Current Ac- | Streams, |
| | tivity, Strait of Gibraltar Region, | W73-02297 6B |
| W73-02419 8G | W73-02496 2J | Committee to the second section in the second section in the second section is a second section of the second section in the section is a second section in the section in the second section is a second section in the second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the section is a second section in the second section in the second section is a second section in the section in the section is a second section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the sec |
| STILLAGUAMISH RIVER (WASH.) | | STRENGTH OF MATERIALS |
| Evaluation of a Winter Steelhead Fishery on a | STRATIFICATION | Fundamentals of Rock Mechanics, |
| | Transition Metals of Impounded Waters, | W73-02372 8E |
| Western Washington River, | W73-01953 5B | |
| W73-02575 8I | W 15-01555 | STRIPED BASS |
| ORDOGE LORGO MODELLO | Density Stratified, Viscous Flow Past a Flat | Effects of Handling and Salinity on Oxygen |
| STOCHASTIC MODELS | Plate, | Requirements of the Striped Bass, Morone |
| A General Stochastic Model for the Transport | W73-02563 8B | Saxatilis, |
| of Sediment Bed Material, | W 75-02505 | W73-02435 5C |
| W73-02315 2J | STRATIGRAPHY | |
| | Morphology and Recent Sediments of the | SUBLETHAL EFFECTS |
| A Random-Walk Simulation Model of Alluvial | Western Alboran Basin in the Mediterranean | A Simple Apparatus for Measuring Activity |
| Fan Deposition, | | Patterns of Fishes. |
| W73-02342 2J | Sea, W73-02494 2J | W73-01977 5A |
| | W73-02494 2J | W/3-015// |
| STOCHASTIC PROCESSES | STREAM GAGES | Pesticide-Induced Stress Profiles. |
| A General Stochastic Model for the Transport | Representative Rural Catchments in Kenya and | W73-02274 5C |
| of Sediment Bed Material, | | 117502214 |
| W73-02315 2J | Uganda, | SUBMARINE PIPELINES |
| | W73-02050 2A | The Undersea AqueductA New Concept in |
| STOCKED FISH | A Summary of Peak Stages and Discharges in | Transportation, |
| The German Carp (Carassius auratus gibelio | | W73-02076 8A |
| Bloch) from the Ilownica River Stocked in a | New York for the Flood of June 1972, W73-02492 2E | 11 13 02010 |
| Carp Pond, | W73-02492 2E | SUBSURFACE DRAINAGE |
| W73-02026 8I | OTED AMELOW | Drain and Irrigate with the Same System, |
| | STREAMFLOW Reshorms to Ground Water from the West | W73-02353 3F |
| STOMATA | Recharge to Ground Water from the West | 3F |
| Influence of Mist Irrigation on Growth, Yields, | Nishnabotna River, | SUBSURFACE IRRIGATION |
| and Quality of Potatoes and Snap Beans, | W73-02033 4B | Drain and Irrigate with the Same System, |
| W73-01966 3F | Creet Stone Goging Stations in Oregon A Com | W73-02353 3F |
| | Crest-Stage Gaging Stations in OregonA Com- | |
| Diffusion Resistance of Leaves in Connection | pilation of Peak Data Collected from October | SUBSURFACE WATERS |
| with their Anatomy (In Russian), | 1952 to September 1972, W73-02034 7C | Subsurface Water as a Major Factor in the For- |
| W73-02133 2I | W73-02034 7C | mation of Landslides on the Left Bank of the |
| | Low-Flow Study of Streams in Albany County, | Chirchik River (Podzemnyye vody-osnovnoy |
| STORAGE | New York, | faktor formirovaniya opolzney levoberezh'ya |
| Preliminary Analysis of Surface Water Availa- | W73-02318 7C | Chirchika), |
| bility, | W13-02310 /C | W73-02066 2J |
| W73-02544 4A | Serial-Correlation Structure of Discretized | 11 13-02000 |
| | Streamflow, | SUGAR BEETS |
| STORM RUNOFF | W73-02323 2E | The Influence of Post-Irrigation Soil Cultiva- |
| Storm Runoff Coefficients for Rivers of the | # 1,5-04525 ZE | tions on the Sugar Beet Yield, (In Bulgarian), |
| Ukraine and Moldavia (Koeffitsiyenty stoka | Investigation of the Rates and Traveltime of | W73-02003 3F |
| dozhdevykh pavodkov na rekakh Ukrainy i | Storm Runoff in the Carpathians (K voprosu ob | 11 13 02003 |
| Moldavii). | issledovanii skorostey i vremeni dobeganiya | SULFATE-REDUCING BACTERIA |
| | | Microbiological Corrosion of Iron and Steel, |
| W73-02333 4A | livnevykh vod v Karpatakh), | W73-02403 8G |
| Investigation of the Rates and Traveltime of | W73-02334 4A | 11 13-02-103 |
| Storm Runoff in the Carpathians (K voprosu ob | Annual Streamflow Fluctuations in the Dni- | SULFATES |
| | ester River Basin (Kolebaniya godovogo stoka | Anion Exchange Equilibria Involving |
| issledovanii skorostey i vremeni dobeganiya | rek basseyna Dnestra), | Phosphate, Sulphate and Chloride, |
| livnevykh vod v Karpatakh), | W73-02335 4A | W73-02208 5D |
| W73-02334 4A | # 13-02333 4A | 11 13-02200 |

| SULFUR COMPOUNDS | SURFACTANTS | TAGGING (FISH) |
|---|--|--|
| The Molluscicide Action of Thiol Reagents (Die | The Effects of Divalent Metal Ions on the | Further Ultrasonic Tracking and Tagging Stu- |
| Molluscizide Wirkung Von Thiol-Reagentien), W73-02275 | Micellar Properties of Sodium Dodecyl Sulfate, W73-02557 2K | dies on Homing Cutthroat Trout (Salmo clarki) in Yellowstone Lake, |
| #13-02213 | W15-02557 | W73-02577 2H |
| SULPHUR BACTERIA | SURVEYS | 4 |
| Microbiological Corrosion in Water Floods, | Photographic Examination of Wells, | TAIGA |
| W73-02404 8G | W73-02409 8G | Snow Structure and Snow Regime of the West Siberian Taiga (Struktura i rezhim snezhnoy |
| SUMMER | SURVIVAL | tolshchi zapadmosibirskoy taygi), |
| Transport in the Baroclinic Coastal Current | Effects of Acute Gamma Radiation and Tem- | W73-02063 2C |
| Near the South Shore of Lake Ontario in Early | perature on Growth and Survival of Juvenile | the second secon |
| Summer, | Rainbow Trout (Salmo Gairdneri), | TANA RIVER (NORWAY) |
| W73-02510 2H | W73-02102 5C | Bedforms of the Tana River, Norway, |
| SUNNY POINT (N.C.) | SUSPENDED LOAD | W73-02047 2C |
| Military Ocean Terminal, Sunny Point, North | Diffusivity of Suspended Matter in the Carib- | TANKER BALLAST |
| Carolina (Draft Environmental Impact State- | bean Sea. | Petroleum Tanker Pollution Monitoring Unit, |
| ment). | W73-02171 2J | W73-02194 5A |
| W73-01981 4A | | TASTE |
| SURCHARGE | SUSPENDED SOLIDS | Artificial Destratification in Reservoirs. |
| The Effects of Sewer Surcharges on the Level | A Method for Isolating Suspended Solids from | W73-02138 5G |
| of Industrial Wastes and the Use of Water by | Sewage Effluents for Measurement of Oxygen Demand. | TO SEE TO SEE THE SECOND SECON |
| Industry, | W73-02207 5D | TAX RATES |
| W73-02115 5G | | A Re-Examination of the Common Pool |
| SURCHARGES | SUSPENSION | Problem, W73-01956 4B |
| User Charges as a Means for Pollution Control: | A Source Study of the Suspended Solids in the | W/3-01930 |
| The Case of Sewer Surcharges, | Gallatin River, W73-02559 5B | TAYLORS BAYOU (TEXAS) |
| W73-02359 5G | W73-02559 5B | Taylors Bayou, Texas, Drainage and Flood |
| | SUSQUEHANNA RIVER | Control Project (Final Environmental Impact |
| Sewer Surcharges and Their Effect on Water, | Suspended Sediment Discharge of the | Statement). W73-02230 8A |
| W73-02360 5G | Susquehanna River at Conowingo, Maryland, | W73-02230 8A |
| The Industrial Demand for Water and Waste | During 1969, | TDEA |
| Treatment in Selected U.S. Cities Which are | W73-02445 2J | Accumulations of Certain Pesticides in Adipose |
| Levying Surcharges, | SWEDEN | Tissues and Performance of Angus, Hereford |
| W73-02361 5G | The Littoral Vegetation at Lake Mjorn in | and Holstein Steers Fed Apple Processing |
| SURF | Western Vastergotland, (In Swedish), | Wastes, W73-02204 5C |
| Edge Waves with Current Shear, | W73-02104 2H | W73-02204 SC |
| W73-02170 2E | CHARLES AND | TECHNICAL FEASIBILITY |
| Lay 111 | SWITZERLAND | Offshore Siting of Electric Power Plants, |
| Effect of Friction on Wave Shoaling, | Comparative Ecologic Investigation on Plateau Fir Forest in the Western Aargau Mountain | W73-02301 6G |
| W73-02173 2E | Area (Switzerland), (In German), | TECHNOLOGY TRANSFER |
| SURFACE DRAINAGE | W73-02056 4A | Evaluation of Selected Aspects of Communica- |
| McCarthy V. Cullen and Son Corp. (Liability | Total Andrew Control of the Chamber I Bulletine | tion of Water Resources Research Information |
| for Alteration of Surface Water Drainage). | Introduction to Study of the Chemical Relation- | Among University Researchers and Users, |
| W73-02245 6E | ships Between the Sediments on the Bottom and the Water of the Lake of Geneva, | W73-02357 6B |
| SURFACE RUNOFF | W73-02592 5C | TEHAMA-COLUSA CENTRAL VALLEY |
| Reuse of Surface Runoff from Furrow Irriga- | | PROJECT |
| tion, | SYNTHESIS | Tehama-Colusa, Central Valley Project, |
| W73-02118 3F | Relation Between Anaerobic ATP Synthesis | California (Final Environmental Impact State- |
| Investigation of the Potes and Torontelland | from Pyruvate and Nitrogen Fixation in Azotobacter vinelandii, | ment). |
| Investigation of the Rates and Traveltime of Storm Runoff in the Carpathians (K voprosu ob | W73-02475 5C | W73-01994 8A |
| issledovanii skorostey i vremeni dobeganiya | The best of the state of the st | TELEMETRY |
| livnevykh vod v Karpatakh), | SYSTEMATICS | Hydrologic Data Collection Via Geostationary |
| W73-02334 4A | Aquatic Insects of the Pine-Popple River, | Satellite, |
| CUBPACE WATER AVAILABLE IT | Wisconsin, W73-02097 5C | W73-02036 7A |
| SURFACE WATER AVAILABILITY Water Supply Sources for the Farmstead and | 11 13-02031 SC | An Automated System for Determining |
| Rural Home. | Studies on Algal Growth, Development, and | Estuarine Bathymetry, |
| W73-02418 4B | Reproduction, | W73-02317 7B |
| The Market State of the Market State of the Market State of the State | W73-02099 5C | |
| SURFACE WATERS | SYSTEMS ANALYSIS | TEMPERATE |
| Water Resources Data for Colorado, 1971: Part | Water Quality Management, An Analysis of In- | Algal Nitrogen Fixation in Temperate Regions, W73-02471 3C |
| 2. Water Quality Records. W73-02039 2K | stitutional Patterns, | W 13-02411 |
| 11,5-02037 ZK | W73-01978 5G | TEMPERATURE |
| Index of Surface Water Stations in Texas, Oc- | No-line Oction I Go to I The control of | Analysis of Thermal Pollution Dispersion, |
| tober 1972. | Nonlinear Optimal Control Theory Applied to a Distributed Feed Biochemical River Reactor | W73-01962 5B |
| W73-02311 7C | with Dual Water Quality and Self Purification | The Delta-Log, a Differential Temperature Sur- |
| Water Economics, | Restraints, | veying Method, |
| W73-02543 4B | W73-02352 5G | W73-02380 8G |

TOTAL Analy water W73-4

Mode Fermi W73-4

Mode Active W73-6

TOXIC

TOXICI Water Effect Data 1 W73-4

A Sir Patter W73-4

The Mollu W73-4

Effec Suspe veline W73-4

Some mium Water W73-

TOXIC An A of Wi W73-

TRACE Stand in a S W73-

TRACE Deter Wate W73-

Trace W73-Effec (Cu, Meta W73-Time ganes W73-

A M Sever port, W73-

The I Uran W73-

The tion, W73-

2H

TEMPERATURE DIFFERENTIAL MEASUREMENT

| TEMPERATURE DIFFERENTIAL | Associated Limestones, San Antonio Area, | THERMOCLINE |
|---|--|---|
| MEASUREMENT | Texas,-1968. W73-02308 2F | Experimental Investigation of the Spatial Form |
| The Delta-Log, a Differential Temperature Surveying Method, | W73-02308 2F | of Large Internal Waves in a Near-Shore Re- gion of Lake Huron, |
| W73-02380 8G | Index of Surface Water Stations in Texas, Oc- tober 1972. | W73-02506 2H |
| TEMPERATURE FLUCTUATIONS | W73-02311 7C | THERMODYNAMIC BEHAVIOR |
| Power Spectral Analysis of Water Temperature | Annual Compilation and Analysis of Hydrolog- | Physical Chemistry of Extraction Processes, W73-02014 1B |
| Fluctuations, W73-02180 5B | ic Data for Little Elm Creek, Trinity River | W 73-02014 |
| W/3-02100 3B | Basin, Texas, 1970, | THIOL GROUPS |
| TEMPERATURE LOGGING | W73-02324 7C | The Molluscicide Action of Thiol Reagents (Die |
| Interpretation of Temperature Logs in Water- and Gas-Injection Wells and Gas-Producing | Annual Compilation and Analysis of Hydrolog- ic Data for Urban Studies in the Fort Worth, | Molluscizide Wirkung Von Thiol-Reagentien), W73-02275 5C |
| Wells, | Texas, Metropolitan Area, 1970, | THISTLE D |
| W73-02405 8G | W73-02482 7C | Contribution to the Ecology of Cirsium Pa- |
| TEMPORAL DISTRIBUTION | Wisconsin Boulder Flow and Its Geomorphic | lustre (L.) Scop, |
| Power Spectral Analysis of Water Temperature | Implications, Franklin Mountains, El Paso | W73-02279 |
| Fluctuations, W73-02180 5B | County, Texas, | THYROID ACTIVITY |
| W/3-02180 3B | W73-02487 2J | Temperature Tolerance and Thyroid Activity of |
| TENNESSEE | THEIS EQUATION | the White Perch Roccus (±Morone) Americanus. |
| Unit Plan for Management of the Hiwassee | A New Approach for Estimating Transmissi- | W73-02273 5C |
| Unit, Cherokee National Forest, Tennessee | bility From Specific Capacity, | |
| (Draft Environmental Impact Statement). W73-02519 4D | W73-02398 8B | THYROID GLANDS |
| 11.302317 | THEORETICAL ANALYSIS | On the Significance of Urochrome in Endemic |
| The Effect of Water Resources on Industrial | New Evidence for Spencer's Laurentian River, | Goiter, W73-02425 5F |
| Growth in the Tennessee Valley Region, | W73-02505 2H | |
| W73-02562 3E | THERMAL CONDUCTIVITY | TIDAL SEDIMENTATION |
| TERRAIN ANALYSIS | The Delta-Log, a Differential Temperature Sur- | Tidal Deposits and Their Sedimentary Struc- |
| Ice-Cored Moraines in Southern British Colum- | veying Method, | tures, W73-02154 2L |
| bia and Alberta, Canada, | W73-02380 8G | |
| W73-02042 2C | THERMAL POLLUTION | TIDES |
| TERTIARY TREATMENT | Analysis of Thermal Pollution Dispersion, | Tidal Deposits and Their Sedimentary Struc- |
| Filtration Boasts Tertiary Treatment, Mixed- | W73-01962 5B | tures, W73-02154 2L |
| Media Filters, Plus Filter Aids, Turn in a Top | Effects of Acute Gamma Radiation and Tem- | |
| Performance, W73-02229 5D | perature on Growth and Survival of Juvenile | TILL |
| W13-02229 3D | Rainbow Trout (Salmo Gairdneri), | The Origin of Fluted Moraine at the Fronts of Contemporary Glaciers, |
| Measures of Organic Pollutants in Wastewater | W73-02102 5C | W73-02045 2J |
| Treatment Plant Operations, | Effects of Temperature on Osmotic and Ionic | |
| W73-02334 5D | Regulation in Goldfish, | TIME OF CONCENTRATION |
| TEST WELLS | W73-02103 5C | Investigation of the Rates and Traveltime of Storm Runoff in the Carpathians (K voprosu ob |
| Testing for and The Development of Ground | Power Spectral Analysis of Water Temperature | issledovanii skorostey i vremeni dobeganiya |
| Water Supplies, | Fluctuations, | livnevykh vod v Karpatakh), |
| W73-02412 4B | W73-02180 5B | W73-02334 4A |
| TEXAS | Fisheries, Cooling-Water Discharges and | TIME OF TRAVEL |
| Construction of Wastewater Facilities, Austin, | Sewage and Industrial Wastes, | Investigation of the Rates and Traveltime of |
| Texas (Final Environmental Impact Statement). | W73-02433 5C | Storm Runoff in the Carpathians (K voprosu ob |
| W73-01980 5D | | issledovanii skorostey i vremeni dobeganiya |
| Chemical Analyses of Water from Wells in | THERMAL SPRINGS Direct Observations of Columnar Scattering | livnevykh vod v Karpatakh), W73-02334 4A |
| Harris County, Texas, 1922-71, | Associated with Geothermal Gas Bubbling in | |
| W73-02038 2K | the Bay of Plenty, New Zealand, | TIME SERIES ANALYSIS |
| Ground-Water Conditions in Anderson, | W73-02052 2L | Power Spectral Analysis of Water Temperature Fluctuations, |
| Cherokee, Freestone, and Henderson Counties, | THERMAL STRATIFICATION | W73-02180 5B |
| Texas. | A Study of the Effects of Island Development | |
| W73-02049 7C | on Lake Water Quality, | TOCICITY Biological Effects of Trinitrotoluene (TNT), |
| The Eyes of Texas Are on U.S. Gypsum, | W73-01954 5C | W73-02101 50 |
| W73-02226 5D | Thermal Effects of Power Plants on Lakes, | Charles . |
| Toulor Bours Tours Designed and The A | W73-02068 2H | TOPOGRAPHY |
| Taylors Bayou, Texas, Drainage and Flood Control Project (Final Environmental Impact | Artificial Destratification in Reservoirs. | The Origin of Fluted Moraine at the Fronts of Contemporary Glaciers, |
| Statement). | W73-02138 5G | W73-02045 |
| W73-02230 8A | | THE PARTY AND A STREET OF THE PARTY. |
| | The Impact of Reduced Light Penetration on a | Historical Changes of Estuarine Topography |
| Chemical Analyses of Water From Observation Wells in the Edwards and Associated | Eutrophic Farm Pond, W73-02349 5C | With Question Of Future Management Policies, W73-02464 50 |
| Limestones, San Antonio Area, Texas, 1967. | | |
| W73-02307 2K | THERMAL WATER | TORONTO (CANADA) |
| Because of Beneficiation Acuifor Ward and | Hydrochemical Study of the National Reactor | Seismic Profiling and Geology of the Toronto |
| Records of Precipitation, Aquifer Head, and Ground-Water Recharge to the Edwards and | Testing Station, Idaho, W73-02484 5B | Waterfront Area of Lake Ontario, W73-02501 2H |
| Otomie mater receimings to me regards and | 75 | |

| Mobilities of Injected Ions in Liquid Water | Simulation of the Mean Performance of Mu- nicipal Waste Treatment Plants, |
|--|--|
| | W73-02212 5E |
| | During Considerations for Torre Torres |
| Information on the Velocity and Flow Pattern | Design Considerations for Large Treatmen |
| | W73-02213 SI |
| W73-02057 5B | 15 Towns Join Hands, W73-02223 51 |
| TRACKING TECHNIQUES | The Pure of Towns Are on H.C. Commun |
| Slicks, | The Eyes of Texas Are on U.S. Gypsum, W73-02226 5I |
| W73-02162 5A | Evaluating Economy of Scale, |
| Multiple Scattering of Laser Light from Turbid | W73-02542 SI |
| W73-02181 5B | TRICKLING FILTERS Phosphorus Removal in Trickling Filters, |
| Effects of Skylight Polarization, Cloudiness, | W73-02220 51 |
| | TRINITROTOLUENE |
| W73-02183 5A | Biological Effects of Trinitrotoluene (TNT), W73-02101 50 |
| An Investigation of Horizontal Diffusion in | TROPHIC LEVEL |
| Lake Ontario, W73-02507 2H | A Study of the Effects of Island Developmer on Lake Water Quality, |
| TRANSPORTANT NORTH TOWN | W73-01954 50 |
| | |
| W73-01953 5B | TROPICAL REGIONS Algal Nitrogen Fixation in the Tropics, |
| TD ANGMISSIBII FTV /TD ANGMISSIUTTV | W73-02473 56 |
| | TROPICAL STORM AGNES (1972) |
| bility From Specific Capacity, | A Summary of Peak Stages and Discharges i |
| W/3-02398 8B | New York for the Flood of June 1972, W73-02492 |
| TRANSMISSION (ELECTRICAL) | |
| | TROUT |
| | Thermal, Turbidity, and pH Conditions of th Upper White River: Sioux and Dawes Coun |
| | ties, Nebraska, |
| | W73-02151 50 |
| bility From Specific Capacity, | Some Effects of Logging and Associated Roa |
| W73-02398 8B | Construction on Northern California Streams, W73-02573 |
| TRANSPIRATION | |
| | TSUGA-HETEROPHYLLA-G Tsuga Heterophylla Forest at Lake McDonald |
| | Glacier National Park, U.S.A., and it |
| W73-02195 2D | Phytogeography, |
| Effect of Poliar Spray and Soil Application of | W73-02201 4. |
| CCC on Transpiration and Dry Matter Produc- | TUBE SETTLERS |
| | High Rate Filtration in Fairfax County, Virginia, |
| | W73-02146 5 |
| | TUBERS |
| to Colorado River Water Supplies, | A Study of the Effects of Mist Irrigation on th |
| W73-02529 5G | Potato (Solanum tuberosum L.) and the Sna |
| TREATMENT FACILITIES | Bean (Phaseolus vulgaris L.), W73-01967 |
| Economic Analyses of Optimal Water Quality | |
| Management, | The Influence of Mist Irrigation on the Potat |
| W/3-01951 3G | IV. Tuber Quality Factors, W73-01968 3 |
| High Rate Filtration in Fairfax County, Vir- | |
| | The Influence of a Short Period of Evaporativ Cooling on the Distribution of 14C in Potat |
| | Plants, W73-01969 3 |
| Treatment Plants, | |
| W73-02209 5F | TUCSON (ARIZ) |
| Treatment Plant at Virginia Mill. | Groundwater Recharge and Quality Transformations During Initiation of a New Sewage Sta |
| W73-02210 5D | bilization Pond (and Management), |
| Reconomic Limit for the Amount of Peserve | W73-02438 |
| Capacity on Construction of Sewage Treatment | Evaluation of a Turfgrass-Soil System to Uti |
| Plants for Rapidly Growing Municipalities, | ize and Purify Waste Water, |
| W/3-02211 5D | W73-02440 5 |
| | Mobilities of Injected Ions in Liquid Water, W73-02114 TRACERS Information on the Velocity and Flow Pattern of Detroit River Water in Western Lake Erie Revealed by an Accidental Salt Spill, W73-02057 TRACKING TECHNIQUES Microwave Emission Characteristics of Oil Slicks, W73-02162 Multiple Scattering of Laser Light from Turbid Water, W73-02181 Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water, W73-02183 An Investigation of Horizontal Diffusion in Lake Ontario, W73-0207 TRANSITION METAL IONS Transition Metals of Impounded Waters, W73-01953 TRANSMISSIBILITY (TRANSMISSIVITY) A New Approach for Estimating Transmissibility From Specific Capacity, W73-02398 TRANSMISSION (ELECTRICAL) Researchers Seek Ways to Lower Costs of Underground Transmission Systems, W73-02074 TRANSMISSIVITY A New Approach for Estimating Transmissibility From Specific Capacity, W73-02398 TRANSMISSIVITY A New Approach for Estimating Transmissibility From Specific Capacity, W73-02074 TRANSMISSIVITY A New Approach for Estimating Transmissibility From Specific Capacity, W73-02094 TRANSMISSIVITY A New Approach for Estimating Transmissibility From Specific Capacity, W73-02094 TRANSPIRATION Leaf Temperature and Transpiration Measurements of Tribulus Cistoides L. In Northern Colombia, W73-02195 Effect of Foliar Spray and Soil Application of CCC on Transpiration and Dry Matter Production of Spring Wheat, W73-02499 2D TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, W73-02499 2D TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, W73-02499 TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, W73-02499 TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, W73-02499 TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, W73-02499 TREATIES The Mexican Water Treaty and its Relationship to Colorado River Water Supplies |

SUBJECT INDEX

URANII The E Urani W73-4

URBAN Nonp Hydro W73-4

Annua ic Da Texas W73-6

On the

USSR Biblio and ti 1965 (Biblio W73-4

Karst nykh W73-4 Engin siolog W73-4

Proble Water okhra W73-4

Soil (Eroz 2.). W73-

Snow Siber tolsho W73-

A Die Geolo geolo W73-

Form Wate North rasch vodo: W73-Subst matio Chirc fakto Chirc W73-Geold W73-

Radio ginee (Radi hener W73-Prote Dniej istocl W73-

TUNNEL CONSTRUCTION

| TUNNEL CONSTRUCTION Construction of Wastewater Facilities, Austin, | Procedures for Evaluation of Water and Re- lated Land Resource Projects. | Development Work is Essential. |
|--|---|---|
| Texas (Final Environmental Impact Statement). | W73-02271 6G | W73-02109 8B |
| W73-01980 5D Mersey Kingsway Tunnel: Construction, | UELSEN (GERMANY) The Effects of Selective Brosion by Overland | Relation of Screen Design to the Design of Mechanically Efficient Wells, |
| W73-02078 8A | Flow on the Ice-Pushed Ridges of Uelsen (County Bentheim, Germany), | W73-02410 8B |
| TUNNELING MACHINES Mersey Kingsway Tunnel: Construction, | W73-02157 2J | UNCONSOLIDATED SEDIMENTS Full Core Recovery in Unconsolidated Forma- |
| W73-02078 8A | UGANDA Representative Rural Catchments in Kenya and | tions, W73-02390 8G |
| TURBIDIMETERS Measurement of Low Turbidities, | Uganda, W73-02050 2A | UNDERGROUND STRUCTURES |
| W73-02147 5A | UKRAINE | Drilling and Grouting Experiences in Un- derground Construction, |
| Applications of Applomerate Testing to | Protection of Water Sources in the Lower | W73-02070 8A |
| Applications of Agglomerate Testing to Problems in Water Resources Management, W73-01965 5F | Dnieper River Basin (Okhrana vodnykh istochnikov v basseyne Nizhnego Dnepra), W73-02329 4A | UNDERGROUND TRANSMISSION LINES Researchers Seek Ways to Lower Costs of Un- |
| Assessment of Turbidity, Color, and Odor in | Hydrologic Investigations and Flow Computa- | derground Transmission Systems, W73-02074 8C |
| Water, W73-01971 5G | tions (Gidrologicheskiye issledovaniya i raschety stoka). | UNDERSEA AQUEDUCT (COLLECTIVE) |
| | W73-02330 4A | The Undersea Aqueduct-A New Concept in |
| Hills Creek Reservoir Turbidity Study, W73-02092 5C | Runoff Coefficients for Areas Between | Transportation, W73-02076 8A |
| Magnesium Carbonate: A Recycled Coagulant - | Isochrones (O koeffitsiyentakh yestestvennogo zaregulirovaniya stoka na mezhizokhronnykh | UNDERWATER |
| II, W73-02145 SF | uchastkakh), W73-02331 4A | The Undersea Aqueduct-A New Concept in Transportation, |
| Measurement of Low Turbidities, | Form of the Relation Between Melt-Water | W73-02076 8A |
| W73-02147 5A | Losses and Some Hydrologic Characteristics | UNDERWATER ACCOUSTICS |
| Thermal, Turbidity, and pH Conditions of the Upper White River: Sioux and Dawes Coun- | (O vozmozhnoy forme zavisimosti poter' ta- lykh vod ot nekotorykh obuslovlivayushchikh faktorov), | Sound Attenuation in Marine Sediments, W73-02467 2J |
| ties, Nebraska, W73-02151 5C | W73-02332 2E | UNDERWATER CONSTRUCTION The Undersea Aqueduct—A New Concept in |
| Multiple Scattering of Laser Light from Turbid | Storm Runoff Coefficients for Rivers of the Ukraine and Moldavia (Koeffitsiyenty stoka | Transportation, |
| Water, W73-02181 5B | dozhdevykh pavodkov na rekakh Ukrainy i | |
| TURRIDITY CURRENTS | Moldavii), W73-02333 4A | UNIT OF CAPACITY Evaluating Economy of Scale, |
| Tentative Data on Flow Resistance in Suspen- | Investigation of the Rates and Traveltime of | W73-02542 5D |
| sion Currents, W73-02156 2J | Storm Runoff in the Carpathians (K voprosu ob | UNITED STATES |
| Morphology and Recent Sediments of the Western Alboran Basin in the Mediterranean | issledovanii skorostey i vremeni dobeganiya livnevykh vod v Karpatakh), W73-02334 | United States V. Pennsylvania Industrial Chemical Corp. (Defenses to Criminal Prosecu- tions under the Refuse Act). |
| Sea, W73-02494 2J | Annual Streamflow Fluctuations in the Dni- | W73-02247 6E |
| TURBULENT FLOW | ester River Basin (Kolebaniya godovogo stoka rek basseyna Dnestra), | Conference Report on S.2770, Amending Federal Water Pollution Control Act. |
| Analysis of Thermal Pollution Dispersion, | W73-02335 4A | W73-02256 6E |
| W73-01962 5B | Study of the Thermal Regime of Rivers (Ob | Characteristics of Estuarine Sediments of the |
| A Unified View of the Law of the Wall Using Mixing-Length Theory, | izuchenii termicheskogo rezhima rek), W73-02336 4A | United States, W73-02481 2L |
| W73-02306 8B | Relation of Ice Freezeup Dates and Ice-Cover | Oil Pollution Act Amendments of 1972 (H.R. |
| TURF GRASSES Groundwater Recharge and Quality Transfor- | Duration to Elevation and Channel Slopes of Carpathian Rivers (O svyazi srokov | 15627), W73-02528 6E |
| mations During Initiation and Management of a | ustanovleniya i prodoizhitel'nosti ledostava s vysotoy mestnosti i uklonami na rekakh Kar- | Conference Report on the Federal Water Pollu- |
| New Stabilization Lagoon, W73-02439 5B | pat), W73-02337 4A | tion Control Act Amendments of 1972, W73-02530 56 |
| TURNING BASIN | | Dow Chemical Co. V. Dixie Carriers, Inc. |
| Hempstead Harbor, New York Navigation Pro- ject (Draft Environmental Impact Statement). W73-01995 8A | ULTRAFILTRATION Flow Ultrafiltration Benefits Equipto, W73-02205 5D | (Private Canal Subject to Regulation Under Rivers and Harbors Act). |
| TURNOVERS | ULTRASONIC | W73-02533 |
| Thermal Effects of Power Plants on Lakes, W73-02068 2H | Further Ultrasonic Tracking and Tagging Stu- dies on Homing Cutthroat Trout (Salmo clarki) | UNTERTRAVE Investigations on the Loading of the Untertrave |
| U.S. WATER RESOURCES COUNCIL | in Yellowstone Lake, W73-02577 2H | with Sewage, (In German), W73-02016 50 |
| Report to the Water Resources Council by the Special Task Force, Findings and Recommen- | ULTRAVIOLET RADIATION | UPLIFT PRESSURE |
| dations. W73-02232 6E | Petroleum Tanker Pollution Monitoring Unit, W73-02194 5A | Uplift Computations for Masonry Dams, W73-02080 |

| URANIUM | Hydrologic Investigations and Flow Computa- | VASCULAR PLANTS |
|--|--|--|
| The Effects on Man of Low Concentrations of | tions (Gidrologicheskiye issledovaniya i | Overgrowing of the Dam Reservoir at Goczal- |
| Uranium, | raschety stoka). | kowice in the Years 1967-1969, |
| W73-02429 5C | W73-02330 4A | W73-02088 2H |
| all the same of th | WASTER ASSEMBLATIVE CAPACITY | WOODS FLOW |
| URBAN HYDROLOGY | Runoff Coefficients for Areas Between | VEGETATION |
| Nonparametric Statistical Methods in Urban | Isochrones (O koeffitsiyentakh yestestvennogo | Vegetation of the Area of the Future Reservoir |
| Hydrologic Research, W73-02175 4C | zaregulirovaniya stoka na mezhizokhronnykh | on the Klenovska Rimava, W73-02087 |
| W73-02175 4C | uchastkakh), | W /3-0206/ |
| Annual Compilation and Analysis of Hydrolog- | W73-02331 4A | The Effect of Soil and Hydrological Conditions |
| ic Data for Urban Studies in the Fort Worth, | Form of the Relation Between Melt-Water | on the Settlement and Productivity of Tree and |
| Texas, Metropolitan Area, 1970, | Losses and Some Hydrologic Characteristics | Shrub Vegetation of Don River Floodplain, (In |
| W73-02482 7C | (O vozmozhnov forme zavisimosti poter' ta- | Russian). |
| | lykh vod ot nekotorykh obuslovlivayushchikh | W73-02199 4A |
| UROCHROME | faktorov). | |
| On the Significance of Urochrome in Endemic | W73-02332 2E | Ecological and Geomorphological Types of |
| Goiter, | 1175-2252 | Flood Plain and the Vegetative Structure of |
| W73-02425 5F | Storm Runoff Coefficients for Rivers of the | River Valleys of the Mid-Volga Basin (In Rus- |
| USSR | Ukraine and Moldavia (Koeffitsiyenty stoka | sian), |
| Bibliography on the Hydrogeology of Siberia | dozhdevykh pavodkov na rekakh Ukrainy i | W73-02276 4A |
| and the Soviet Far East for the Period 1918- | Moldavii), | Ecology of Jalore District in Western |
| 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | W73-02333 4A | Rajasthan, |
| Bibliograficheskiy ukazatel'. 1918-1965), | | W73-02600 4A |
| W73-02058 2F | Investigation of the Rates and Traveltime of | W 15-02000 |
| W 73-02036 ZF | Storm Runoff in the Carpathians (K. voprosu ob | VEHICULAR TUNNELS |
| Karst in Carbonate Rocks (Karst v karbonat- | issledovanii skorostey i vremeni dobeganiya | Mersey Kingsway Tunnel: Construction, |
| nykh porodakh). | livnevykh vod v Karpatakh), | W73-02078 8A |
| W73-02059 2F | W73-02334 4A | |
| AND CONTRACTOR OF THE PARTY OF | | VELOCITY-GRADIENT PATHS |
| Engineering Glaciology (Inzhenernaya glyat- | Annual Streamflow Fluctuations in the Dni- | Applications of Agglomerate Testing to |
| siologiya). | ester River Basin (Kolebaniya godovogo stoka | Problems in Water Resources Management, |
| W73-02060 2C | rek basseyna Dnestra), | W73-01965 5F |
| Political de Walle de 100 de 1 | W73-02335 4A | VENTURA COUNTY (CAT III) |
| Problems in the Utilization and Conservation of | Study of the Thermal Regime of Rivers (Ob | VENTURA COUNTY (CALIF) |
| Water Resources (Problemy ispol'zovaniya i | izuchenii termicheskogo rezhima rek). | Port Hueneme Harbor, Ventura County, California (Draft Environmental Impact State- |
| okhrany vodnykh resursov). | W73-02336 4A | ment). |
| W73-02061 4A | W 13-02330 4A | W73-01984 8A |
| Soil Erosion and Channel Processes. No. 2. | Relation of Ice Freezeup Dates and Ice-Cover | W 13-01304 an |
| (Eroziva pochy i ruslovyve protsessy. Vypusk | Duration to Elevation and Channel Slopes of | VIENNA |
| 2.). | Carpathian Rivers (O svyazi srokov | Vienna-Blumental Sewage Treatment Plant, |
| W73-02062 2J | ustanovleniya i prodoizhitel'nosti ledostava s | W73-02197 5D |
| | vysotoy mestnosti i uklonami na rekakh Kar- | A STATE OF THE PARTY OF THE REAL PROPERTY OF THE PARTY OF |
| Snow Structure and Snow Regime of the West | pat), | VIRGINIA |
| Siberian Taiga (Struktura i rezhim snezhnoy | W73-02337 4A | An Ecosystematic Study of the South River, |
| tolshchi zapadmosibirskoy taygi), | | Virginia, |
| W73-02063 2C | UTAH | W73-01972 5C |
| 4 701-01-01-01-01-01-01-01-01-01-01-01-01-0 | A Mixed Integer Programming Approach to | High Rate Filtration in Fairfax County, Vir- |
| A Dictionary of Hydrogeology and Engineering | Planning Multiple Water Sources for Municipal | ginia. |
| Geology (Slovar' po gidrogeologii i inzhenernoy | Water Supply, | W73-02146 5F |
| geologii), | W73-02540 6A | # 15-02140 JF |
| W73-02064 10A | NAMES AND ADDRESS OF THE PARTY | Polyethylene Pipe Used for 36-In Sewage Out- |
| Formation and Calculation of Elements of the | UZBEK SSR | fall. |
| Water Balance for Small Watersheds of | Subsurface Water as a Major Factor in the For- | W73-02188 5D |
| Northern Kazakhstan (Formirovaniye i | mation of Landslides on the Left Bank of the | |
| raschety elementov vodnogo balansa malykh | Chirchik River (Podzemnyye vody-osnovnoy | Treatment Plant at Virginia Mill. |
| vodosborov Severnogo Kazakhstana). | faktor formirovaniya opolzney levoberezh'ya | W73-02210 5D |
| W73-02065 2A | Chirchika), | Investigations on Nutrient Factors Limiting |
| Commencial Charge and Commencial States of Commencial C | W73-02066 2J | Phytoplankton Productivity in Two Central Vir- |
| Subsurface Water as a Major Factor in the For- | UZBEKISTAN | ginia Ponds, |
| mation of Landslides on the Left Bank of the | Determination of Moisture Supply and Cotton | W73-02452 5C |
| Chirchik River (Podzemnyye vody-osnovnoy | Yield in Uzbekistan, (In Russian), | |
| faktor formirovaniya opolzney levoberezh'ya | W73-02008 3F | VIRICIDES |
| Chirchika), | 1173-02000 | Virucidal Effects of Chlorine in Wastewater, |
| W73-02066 2J | VALUE | W73-02538 5D |
| Geology and Dams. Volume IV. | Evaluating Recreational Potential of Small | VIBRIORE |
| | Streams, | VIRUSES E. Cali on on Indicator Occasion for Disinform |
| W73-02067 8A | W73-02297 6B | E. Coli as an Indicator Organism for Disinfec- |
| Radioisotope Investigation Techniques in En- | | tion of Water with Respect to Enteroviruses Under Various Conditions. |
| gineering Geology and Hydrogeology | VALVE MORPHOLOGY | W73-02085 SF |
| (Radioizotopnyye metody issledovaniya v inz- | Salinity-Related Polymorphism in the Brackish- | 117-02005 SF |
| henernoy geologii i gidrogeologii), | Water Diatom Cyclotella Cryptica, | Disinfection of Drinking Water Containing En- |
| W73-02328 8G | W73-02548 5C | teroviruses with Electrolytic Products of Com- |
| abunda time bootself moveds if | And the state of t | mon Salt, |
| Protection of Water Sources in the Lower | VALVE PATTERN CHARACTERISTICS | W73-02089 5F |
| Dnieper River Basin (Okhrana vodnykh | Salinity-Related Polymorphism in the Brackish- | |
| istochnikov v basseyne Nizhnego Dnepra), | Water Diatom Cyclotella Cryptica, | Virucidal Effects of Chlorine in Wastewater, |
| W73-02329 4A | W73-02548 5C | W73-02538 5D |

Meast Treats W73-0

Analy water W73-0

Separa Adsor W73-0

Mecha watera W73-0

Prever Use of W73-0

Resista pound W73-0

Metho Standa W73-0

Anion Waster W73-0

Virucio W73-0

Experi Califor W73-0

Model Activa W73-0

Model Ferme W73-0 WATER Assess Water, W73-0

WATER Admin Need f W73-0

Courts Proces W73-0

WATER The D Nickel W73-02

A Qual Instruct W73-00 Neutro Review W73-00

Labora Polluta W73-02

Method Wastev W73-02

| VISCOSITY Tentative Data on Flow Resistance in Suspen- | WASHOUTS Modeling and Analysis of Washout in Tower | Vienna-Blumental Sewage Treatment Plant, W73-02197 5D |
|--|--|--|
| sion Currents, W73-02156 2J | Fermentation Processes, W73-02554 5D | Regeneration of Steelworks Hydrochloric Acid |
| | A CONTRACTOR OF THE PARTY OF TH | Pickle Liquor, |
| VISCOUS FLOW Density Stratified, Viscous Flow Past a Flat | WASTE ASSIMILATIVE CAPACITY Nonlinear Optimal Control Theory Applied to a | W73-02198 5D |
| Plate, W73-02563 8B | Distributed Feed Biochemical River Reactor with Dus. Water Quality and Self Purification | Wastewater Treatment by Ion Exchange, W73-02202 5D |
| William Control of the Control of th | Restraints, | Practical Experience in the use of Polyelec- |
| VISTULA RIVER Dace (Leuciscus Leuciscus L.) from the Upper | W73-02352 5G WASTE DISPOSAL | trolytes, W73-02203 5D |
| Vistula and Czarna Przemsza, W73-02090 2I | Pollution of Subsurface Water by Sanitary | |
| VLADIMIR OBLAST | Landfills. Vol 2, W73-02106 5B | Flow Ultrafiltration Benefits Equipto, W73-02205 5D |
| Distribution of the Water Chestnut Trapa natans L. s. l. in the Floodplains of Bodies of | Pollution of Surface Water by Sanitary Landfills. Vol 3, | A Method for Isolating Suspended Solids from Sewage Effluents for Measurement of Oxygen |
| Water in the Vladimir Oblast and Their Hydrochemical Characterization, (In Russian), | W73-02107 5B | Demand, |
| W73-02000 2I | Accumulations of Certain Pesticides in Adipose | W73-02207 5D |
| VOLGA RIVER BASIN Ecological and Geomorphological Types of | Tissues and Performance of Angus, Hereford and Holstein Steers Fed Apple Processing | Anion Exchange Equilibria Involving Phosphate, Sulphate and Chloride, |
| Flood Plain and the Vegetative Structure of | Wastes, | W73-02208 5D |
| River Valleys of the Mid-Volga Basin (In Rus- | W73-02204 5C | Design-Operation Interactions for Wastewater |
| sian), W73-02276 4A | Prompt Passage of Ocean Dumping Bill is Urged, | Treatment Plants, W73-02209 5F |
| VOLGOGRAD RESERVOIR | W73-02255 6E | |
| Distribution of Fish in the Volgograd Reser- | The Need to Control Ocean Dumping, | Treatment Plant at Virginia Mill. |
| voir, (In Russian), | W73-02526 6E | W73-02210 5D |
| W73-02591 2H | | Simulation of the Mean Performance of Mu- |
| VOLUMETRIC ANALYSIS Analysis of Residual Total Nitrogen in Waste- | WASTE DUMPS Prompt Passage of Ocean Dumping Bill is | nicipal Waste Treatment Plants, W73-02212 5D |
| waters, | Urged, W73-02255 6E | Industrial Waste and the Small City. |
| W73-02345 5A | | W73-02214 5D |
| Well Logs in Carbonate Reservoirs, | The Need to Control Ocean Dumping, | |
| W73-02424 4B | W73-02526 6E | Phosphorus Removal in Trickling Filters, W73-02220 5D |
| VOLVE BODOL LAN (LIEED) | WASTE TREATMENT | W 75-02220 5D |
| VOLYN-PODOLIAN (USSR) Characteristics of Structure and Antierosive Role of Root Systems of Woody and Shrub | Polyethylene Pipe Used for 36-In Sewage Out- fall. W73-02188 5D | A Statistical Study of The Effects of Polyelec- trolytes, Mixing and pH Upon an Activated Sludge System, |
| Species in Eroded Lands of the Volyn-Podolian | C | W73-02221 5D |
| Upland (In Russian), W73-02055 2I | Great Lakes Adds New Woodroom and Fluid Bed Reactor, | |
| WASHING DOWN | W73-02190 5D | Removal of Toxic Pesticides by Reverse Osmo- sis Water Treatment, |
| Procedures for Installing Well Screens. | Water and Sewage Sludge Absorption by Solid | W73-02222 5D |
| W73-02415 8A | Waste, | 15 Towns Join Hands, |
| WASHINGTON | W73-02191 5D | W73-02223 5D |
| Radionuclides in Transport in the Columbia River from Pasco to Vancouver, Washington, | WASTE TREATMENT DEMAND User Charges as a Means for Pollution Control: | Studies on Reverse Osmosis for Water Pollu- |
| W73-02022 5B | The Case of Sewer Surcharges, | tion Control, W73-02225 5D |
| Environmental Management for Puget Sound: | W73-02359 5G | W 13-02223 |
| Certain Problems of Political Organization and Alternative Approaches, | Sewer Surcharges and Their Effect on Water, W73-02360 5G | The Eyes of Texas Are on U.S. Gypsum, W73-02226 5D |
| W73-02251 6E | | Saving the Dragout Keeps Plater Within |
| A Study of Sediments from Bellingham Harbor | WASTE WATER DISPOSAL Water Pollution by Oil-Field Brines and Re- lated Industrial Wastes in Ohio, | Discharge Limits, W73-02227 5D |
| as Related to Marine Disposal, W73-02461 5C | W73-02192 5B | |
| | The Property of Assessed to Management | Filtration Boasts Tertiary Treatment, Mixed- Media Filters, Plus Filter Aids, Turn in a Top |
| Hydro-Ecological Problems of Marinas in Puget Sound, | The Economics of Automation in Wastewater Treatment, | Performance, |
| W73-02462 5C | W73-02293 5D | The state of the s |
| Newhalem Creek Project, Washington (Draft Environmental Impact Statement). | WASTE WATER TREATMENT Applications of Agglomerate Testing to | Towards Greater Water Re-Use, W73-02286 5D |
| W73-02522 8C | Problems in Water Resources Management, W73-01965 5F | The Economics of Automation in Wastewater |
| Methodology in Establishing Water Quality | | Treatment, |
| Standards, W73-02536 5G | Construction of Wastewater Facilities, Austin, Texas (Final Environmental Impact Statement). | W73-02293 5D |
| | W73-01980 5D | Wastewater Treatment Works Planning, |
| Evaluation of a Winter Steelhead Fishery on a | | Economics and Technology-Some New Directions, |
| Western Washington River, W73-02575 | Oneida Shows the Way To Go, W73-02196 5D | W73-02296 5D |
| | | |

| Measures of Organic Pollutants in Wastewater | WATER AVAILABILITY | Development of Numerical Models of Lake |
|--|---|--|
| Treatment Plant Operations, W73-02334 5D | Preliminary Analysis of Surface Water Availa- bility, | Ontario, W73-02511 2H |
| Analysis of Residual Total Nitrogen in Waste- | W73-02544 4A | WATER CONFINEMENT |
| waters, | WATER BALANCE | A Proven Squeeze-Cementing Technique in a |
| W73-02345 5A | Recharge to Ground Water from the West Nishnabotna River. | Dolomite Reservoir, W73-02421 8F |
| Separation of Lignin from Aqueous Solution by | W73-02033 4B | WATER CONSERVATION |
| Adsorptive Bubble Separation Processes, W73-02350 5D | Delay of Runoff from a Glacier Basin, | Problems in the Utilization and Conservation of |
| Mechanisms of Change in Activated Sludge De- | W73-02048 2C | Water Resources (Problemy ispol'zovaniya i okhrany vodnykh resursov). |
| waterability During Aerobic Digestion, | Formation and Calculation of Elements of the | W73-02061 4A |
| W73-02362 5D | Water Balance for Small Watersheds of Northern Kazakhstan (Formirovaniye i | Reuse of Surface Runoff from Furrow Irriga- |
| Prevention of Pollution From the Industrial Use of Oil. | raschety elementov vodnogo balansa malykh | tion, W73-02118 3F |
| W73-02434 5D | vodosborov Severnogo Kazakhstana). W73-02065 2A | Great Lakes Adds New Woodroom and Fluid |
| Resistance of Carcinogenic Organic Com- | Protection of Water Sources in the Lower | Bed Reactor, W73-02190 5D |
| pounds to Oxidation by Activated Sludge, W73-02535 SD | Dnieper River Basin (Okhrana vodnykh | |
| | istochnikov v basseyne Nizhnego Dnepra), W73-02329 | WATER CONSUMPTION Alternative Demands for Water and Land for |
| Methodology in Establishing Water Quality Standards. | | Agricultural Purposes, |
| W73-02536 5G | WATER 'BLOOMING' Characterization of Phenols in Areas of Water | W73-02363 6D |
| Anion Exchange and Filtration Techniques for | 'Blooming' in Open Bodies of Water, | WATER DEMAND Assessment of Turbidity, Color, and Odor in |
| Wastewater Renovation, | W73-02460 5C | Water, |
| W73-02537 5D | WATER CHEMISTRY | W73-01971 5G |
| Virucidal Effects of Chlorine in Wastewater, W73-02538 5D | Direct Observations of Columnar Scattering Associated with Geothermal Gas Bubbling in the Bay of Plenty, New Zealand, | Water for the West, W73-02129 6D |
| Experiences with Wastewater Disinfection in | W73-02052 2L | Sewer Surcharges and Their Effect on Water |
| California, W73-02539 5D | Geochemistry of Ground Waters from Burg El- | Use, W73-02295 5G |
| | Arab Area, Egypt, W73-02053 2K | The state of the s |
| Modeling and Optimization of a Tower-Type Activated Sludge System, | | A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal |
| W73-02553 5D | Thermal, Turbidity, and pH Conditions of the Upper White River: Sioux and Dawes Coun- | Water Supply, W73-02540 6A |
| Modeling and Analysis of Washout in Tower | ties, Nebraska, | |
| Fermentation Processes, W73-02554 5D | W73-02151 5C | WATER DEMANDS Alternative Demands for Water and Land for |
| WATER ACCEPTABILITY | Chemical Aspects of Bioassay Techniques for Establishing Water Quality Criteria, | Agricultural Purposes, W73-02363 6D |
| Assessment of Turbidity, Color, and Odor in | W73-02446 5A | |
| Water, | Hydrochemical Study of the National Reactor | Water Economics, W73-02543 4B |
| W73-01971 5G | Testing Station, Idaho, | WATER DISTRIBUTION |
| WATER ALLOCATION (POLICY) Administering State Water Resources: The | W73-02484 5B | Regional Management of Water Supply and |
| Need for Long Range Planning, | WATER CHESTNUT | Wastewater Disposal Facilities, W73-02354 6B |
| W73-01979 6E | Distribution of the Water Chestnut Trapa natans L. s. l. in the Floodplains of Bodies of | |
| Courts and Water, The Role of the Judicial | Water in the Vladimir Oblast and Their Hydrochemical Characterization, (In Russian), | WATER DISTRIBUTION (APPLIED) Administering State Water Resources: The |
| Process, W73-02365 6E | W73-02000 2I | Need for Long Range Planning, |
| WATER ANALYSIS | WATER CIRCULATION | W73-01979 · 6E |
| The Determination of Traces of Cobalt and of Nickel in Mineral Waters, | Circulation and Hydrology Under the Seasonal Ice in McMurdo Sound, Antarctica, | Water Utility Distribution Loss, W73-02431 50 |
| W73-02071 2K | W73-02051 2C | WATER EQUIVALENT |
| A Quantitative Evaluation of Dissolved Oxygen | Information on the Velocity and Flow Pattern | Average Water Content of Snowpack in Maine, W73-02326 |
| Instrumentation, | of Detroit River Water in Western Lake Erie Revealed by an Accidental Salt Spill, | |
| W73-02165 5B Neutron Activation Analysis of WaterA | W73-02057 5B | WATER FLOODING Interpretation of Temperature Logs in Water and Gas-Injection Wells and Gas-Producing |
| Review, | The Coastal Boundary Layers of a Lake, | Wells, |
| W73-02166 5A | W73-02508 2H | W73-02405 80 |
| Laboratory Methods for the Measurement of | Winter Circulation in Lake Ontario, W73-02509 2H | WATER HARDNESS |
| Pollutants in Water and Waste Effluents, W73-02167 5A | | What's So Great About MgCO3, W73-02219 5E |
| Methods for Organic Pesticides in Water and | Transport in the Baroclinic Coastal Current Near the South Shore of Lake Ontario in Early | WATER HYACINTH |
| Wastewater. | Summer, | Nutrient Removal by Waterhyacinth, |

| WATER LAW | WATER POLLUTION | Economic Analysis of Alternative Water Pollu- |
|--|--|---|
| Defending the EnvironmentA Case History, W73-02250 6E | Water Pollution by Oil-Field Brines and Re- lated Industrial Wastes in Ohio, | tion Control Measures, W73-02550 5G |
| Laws for a Better Environment. | W73-02192 5B | WATER POLLUTION EFFECTS |
| W73-02560 6E | Pollution Control Shines in Chrome Chemicals | An Ecosystematic Study of the South River, Virginia, |
| WATER LETTUCE | W73-02282 5G | W73-01972 5C |
| Observations of Declining Water Lettuce Popu- | | Water Quality Criteria Data Book - Volume 3: |
| lations in Lake Izabal, Guatemala, W73-02549 2H | Power, Pollution, and Public Policy, Issues in Electric Power Production, Shoreline Recrea- tion, and Air and Water Pollution Facing New | Effects of Chemicals on Aquatic Life, Selected Data from the Literature Through 1968. |
| WATER LEVEL FLUCTUATIONS | England and the Nation. | W73-01976 5C |
| Water Table Fluctuations in the Meerut Dis- trict, Uttar Pradesh, India, | W73-02299 6G | Fish Populations Around Edgewood Arsenal's |
| W73-02044 4B | WATER POLLUTION CONTROL | Chemical Agent Test Area, W73-02021 5C |
| Rodman Drawdown Saves Trees, | Surface Waters of a Small City (Springfield, | |
| W73-02258 6E | Mass), W73-01961 6G | The West Falmouth Oil Spill. I. Biology, W73-02023 5C |
| The Effect of Water Level Fluctuations on a | W/3-01901 | W73-02023 5C |
| Littoral Fauna, W73-02477 5C | Magnesium Bisulfite Recovery Startup, W73-02224 5D | The West Falmouth Oil Spill. Data Available in 1971. II. Chemistry, |
| The state of the s | | W73-02024 5C |
| WATER LEVEL RECORDERS | The Ministry's Memorandum on 'Standards of Effluents to Rivers With Particular Reference | Description of Alabama Estuarine Areas- |
| A Portable Airline to Measure Water Level, W73-02382 7B | to Industrial Effluents': A Review, | Cooperative Gulf of Mexico Estuarine Invento- |
| | W73-02228 5G | ry, |
| WATER LEVELS | | W73-02037 2L |
| Records of Precipitation, Aquifer Head, and Ground-Water Recharge to the Edwards and | Minnesota Pollution Control Agency V. Hat- field (Public Expenditures for Water Pollution | Pesticides and Freshwater Fauna, W73-02098 5B |
| Associated Limestones, San Antonio Area, Texas, 1968. | Abatement as a Legitimate Public Purpose). W73-02240 6E | |
| W73-02308 2F | #75-02240 | Effects of Acute Gamma Radiation and Tem- |
| CONTRACTOR OF THE PARTY OF THE | Clean Rhetoric and Dirty Water, | perature on Growth and Survival of Juvenile Rainbow Trout (Salmo Gairdneri), |
| History of Water Level Gauges, LAKE Erie and The Niagara River. | W73-02260 6E | W73-02102 5C |
| W73-02493 7C | Toxicological Studies on Emulsions for the | Physical-Chemical Crisis IndicatorsAre There |
| (830-7) | Combatting of Oil Pollution (Toxikologische | Any, |
| WATER LOSS Water Utility Distribution Loss, | Untersuchung Von Emulgatoren Fuer Die | W73-02150 5A |
| W73-02431 5G | Bekaempfung Von Oelverschmutzungen), W73-02281 5C | Conrad V. Board of Supervisors of Lee County |
| Wales Story Common Property was N | W/3-02261 | (Extent of Liability for Pollution of Private |
| WATER MANAGEMENT Objectives of Water Resource Management - | Water Quality Improvement in Boston Harbor, W73-02303 6G | Pond). W73-02244 6E |
| Can They Be Achieved Through Legislation, W73-02561 6E | | |
| W/3-02301 | User Charges as a Means for Pollution Control: The Case of Sewer Surcharges, | Pesticide-Induced Stress Profiles, W73-02274 5C |
| WATER MANAGEMENT (APPLIED) | W73-02359 5G | |
| Environmental Management for Puget Sound: | | Effect of Lime Neutralized Iron Hydroxide |
| Certain Problems of Political Organization and Alternative Approaches, | Sewer Surcharges and Their Effect on Water, | Suspensions on Juvenile Brook Trout (Salvelinus Fontinalis, Mitchill), |
| W73-02251 6E | W73-02360 5G | W73-02277 5C |
| | The Industrial Demand for Water and Waste | |
| Leading Creek Conservancy District (Final Environmental Impact Statement). | Treatment in Selected U.S. Cities Which are Levying Surcharges, | Metabolism of DDT by Fresh Water Diatoms, W73-02280 5C |
| W73-02267 5F | W73-02361 5G | Toxicological Studies on Emulsions for the |
| WATER MEASUREMENT | Water Pollution Control in the United States. | Combatting of Oil Pollution (Toxikologische |
| Hydraulic Model Studies of Scoggins Dam Fish Trap Aerator and Supply Structure, | W73-02366 5G | Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen). |
| W73-02069 8I | Recent Federal Policies Affecting Marine | W73-02281 5C |
| WATER MEASUREMENT SYSTEMS | Science and Engineering Development, | A Survey of the Benthic Macroinvertebrate |
| Assessment of Turbidity, Color, and Odor in | W73-02466 5C | Populations in the New Hope and Lower Haw |
| Water, | Role of Phosphorus in Eutrophication and Dif- | Rivers, W73-02355 5B |
| W73-01971 5G | fuse Source Control, | a white I have not be to reason and it is become that |
| WATER POLICY | W73-02478 5C | Fisheries, Cooling-Water Discharges and |
| On the Recreational Use of Domestic Water Supply Reservoirs. | Ways in Which a Resident of the Madison | Sewage and Industrial Wastes, W73-02433 5C |
| W73-02132 5G | Lakes' Watershed may Help to Improve Water | and the second second arms of |
| | Quality in the Lakes, W73-02479 5C | WATER POLLUTION SOURCES Effect of Animal Wastes Applied to Soils on |
| Management Problems in Flood Plain Areas, | 11702419 | Surface and Ground Water Systems, |
| W73-02288 6F | Environmental Quality. A Challenge for | W73-01960 5B |
| Alternative Adjustments to Natural Hazards, W73-02367 6F | Achievement, W73-02485 5G | Determination of the Rate of Biodegradation in |
| Objection of Water P | Maintenance of Water Quality-Alberta's | Some Polluted Tropical Waters and in Some |
| Objectives of Water Resource Management - Can They Be Achieved Through Legislation, | Legislative Scheme and the Common Law, | Types of Liquid Wastes Common in Puerto Rico, W73-01973 5B |
| W73-02561 - 6E | W73-02525 5G | W73-01973 5B |

Pollution Landfills.

W73-0210 Pollution

W73-0210

Multiple :

Water, W73-0218

Water Po lated Indu W73-0219

Conrad V

(Extent

Pond). W73-0224

Analysis cides in V W73-0231

A Mass Several I

port, W73-0234

Water we

W73-0241

Groundw

mations I

New Stat

W73-0243

Microbia Solutions W73-0253

A Source

Gallatin I W73-0255

WATER PO

Commun W73-0214

Clean Rh W73-0226

WATER PE A Water W73-025

WATER PU

Problems

Water R

okhrany W73-020

Commun

W73-0214

WATER Q

Chemical Harris Co

W73-0203

Water Re W73-0203

Ground-1 Cherokee Texas.

W73-020

Water Q Multispec W73-0211

| Pollution of Subsurface Water by Sanitary Landfills, Vol 2. | Water Quality Improvement in Boston Harbor, W73-02303 6G | WATER QUALITY STANDARDS Economic Analyses of Optimal Water Quality |
|---|--|--|
| W73-02106 5B | A PARTY NAMED IN COLUMN TO SERVICE AND ADDRESS OF THE PARTY NAMED IN C | Management, |
| Pollution of Surface Water by Sanitary Land- | Chemical Analyses of Water From Observation Wells in the Edwards and Associated | W73-01951 5G |
| fills. Vol 3, W73-02107 5B | Limestones, San Antonio Area, Texas, 1967. | Assessment of Turbidity, Color, and Odor in Water. |
| | W73-02307 2K | W73-01971 5G |
| Multiple Scattering of Laser Light from Turbid Water. | Low-Flow Study of Streams in Albany County, New York. | Proposed Reclassifications of Certain Waters in |
| W73-02181 5B | W73-02318 7C | the Cape Fear, Lumber, and Yadkin-Pee Dee |
| Water Pollution by Oil-Field Brines and Re- | Separation of Lignin from Aqueous Solution by | River Basins to be Considered at a Public Hear- ing to be Held on November 2, 1972, in |
| lated Industrial Wastes in Ohio, W73-02192 5B | Adsorptive Bubble Separation Processes, | Southern Pines, North Carolina. |
| | W73-02350 5D | W73-01983 5G |
| Conrad V. Board of Supervisors of Lee County (Extent of Liability for Pollution of Private | Courts and Water, The Role of the Judicial | Environmental Control Administration Water |
| Pond). | Process, W73-02365 6E | Hygiene Programs, W73-02125 5G |
| W73-02244 6E | | Commence of the last of the la |
| Analysis of Chlorinated Hydrocarbon Pesti- cides in Waters and Wastewaters, | Water Pollution Control in the United States. W73-02366 5G | Influence of Stream Quality Standards on Pota- ble Quality, Need for Standards, W73-02130 5G |
| W73-02313 5A | Electric Logging Applied to Ground Water Ex- | |
| A Mass Balance Model of Trace Metals in | ploration, | The Ministry's Memorandum on 'Standards of Effluents to Rivers With Particular Reference |
| Several Delaware WatershedsA Progress Re- port, | W73-02402 8G | to Industrial Effluents': A Review, |
| W73-02341 5B | Water Quality Characteristics and Their Mea- | W73-02228 5G |
| Water wells and Ground Water Contamination, | surement, W73-02427 5A | Nonlinear Optimal Control Theory Applied to a |
| W73-02413 5B | | Distributed Feed Biochemical River Reactor with Dual Water Quality and Self Purification |
| Groundwater Recharge and Quality Transfor- | Some Studies on the Chronic Toxicity of Cad- mium and Hexavalent Chromium in Drinking | Restraints, |
| mations During Initiation and Management of a | Water, | W73-02352 5G |
| New Stabilization Lagoon, W73-02439 5B | W73-02428 5C | Chemical Aspects of Bioassay Techniques for |
| Microbial Degradation of Pesticides in Aqueous | The Effects on Man of Low Concentrations of | Establishing Water Quality Criteria, |
| Solutions, | Uranium, W73-02429 5C | W73-02446 5A |
| W73-02534 5B | The second secon | An Appraisal of the PCB Situation in the State |
| A Source Study of the Suspended Solids in the | Water Quality Changes in the Distribution System. | of Wisconsin, W73-02447 5C |
| Gallatin River, W73-02559 5B | W73-02430 5F | Methodology in Establishing Water Quality |
| WATER POLLUTION TREATMENT | Automatic System for Monitoring Water Quali- | Standards, |
| Community Water Pollution R and D Needs. | ty, | W73-02536 5G |
| W73-02144 5G | W73-02432 5A | WATER RESOURCES |
| Clean Rhetoric and Dirty Water, | The Syslab System for Data Analysis of Histor- | Problems in the Utilization and Conservation of Water Resources (Problemy ispol'zovaniya i |
| W73-02260 6E | ical Water-Quality Records (Basic Programs), W73-02437 | okhrany vodnykh resursov). |
| WATER PROPERTIES | WATER OUL I THE CONTROL | W73-02061 4A |
| A Water Use Map of the Great Lakes Basin, W73-02512 2H | WATER QUALITY CONTROL Water Quality Management, An Analysis of In- | Authorization and Appropriation Processes for Water Resource Development, |
| WATER PURIFICATION | stitutional Patterns, W73-01978 5G | W73-02364 6E |
| Problems in the Utilization and Conservation of | | The Effect of Water Resources on Industrial |
| Water Resources (Problemy ispol'zovaniya i okhrany vodnykh resursov). | Environmental Control Administration Water Hygiene Programs, | Growth in the Tennessee Valley Region, |
| W73-02061 4A | W73-02125 5G | W73-02562 3E |
| Community Water Pollution R and D Needs. | Influence of Stream Quality Standards on Pota- | WATER RESOURCES COUNCIL |
| W73-02144 5G | ble Quality, Need for Standards, | What Price Water, W73-02284 6B |
| WATER QUALITY | W73-02130 5G | WATER RESOURCES DEVELOPMENT |
| Chemical Analyses of Water from Wells in | Monitoring New York's Water Automatically, | Administering State Water Resources: The |
| Harris County, Texas, 1922-71, W73-02038 2K | W73-02135 5G | Need for Long Range Planning, |
| Water Resources Data for Colorado, 1971: Part | Clean Rhetoric and Dirty Water, | W73-01979 6E |
| 2. Water Quality Records. | W73-02260 6E | Revision of Completed Regional or River Basin |
| W73-02039 2K | Nonlinear Optimal Control Theory Applied to a | Plans, A Policy Statement. W73-01992 6B |
| Ground-Water Conditions in Anderson, | Distributed Feed Biochemical River Reactor with Dual Water Quality and Self Purification | The Undersea Aqueduct-A New Concept in |
| Cherokee, Freestone, and Henderson Counties, Texas. | Restraints, | Transportation, |
| W73-02049 7C | W73-02352 5G | W73-02076 8A |
| Water Quality Measurements with Airborne | Microbial Degradation of Pesticides in Aqueous | Proposed Principles and Standards for Planning |
| Multispectral Scanners, | Solutions, | Water and Related Land Resources. W73-02231 6E |
| W73-02182 5A | W73-02534 5B | # 15-02231 OE |

SUBJECT INDEX

WATER Proble Water okhras W73-0

Protect Dniepe istochr W73-02

A Wate W73-02

WATER Mobilit

WATER
A ReProblem
W73-01

Chemic Harris W73-02

Ground Cherok Texas. W73-02 Develop W73-02 Water V W73-02: Notes Drilling W73-02:

Hydrau W73-02 Yields (linois, W73-02 Effect (W73-02

The Te struction W73-023

Boundar Wells, W73-023 Hydraulings, W73-023 Yields of Dian Roc Dian Roc W73-024 Electric ploration W73-024 Well Gro W73-024 Photogra W73-024

WATER RESOURCES DEVELOPMENT

| The Problems and Issues of Implementing Na- | Research Needed on Availability and Develop- | WATER TREATMENT |
|--|--|--|
| tional Water Legislation at Subnational Levels, W73-02242 6E | ment of Water Supply. W73-02126 6B | Treatment of Waste Sludges from Water Purifi- cation Plants, |
| Public Works on Rivers and Harbors (Bill | Water for the West, W73-02129 6D | W73-01964 5F |
| S.4018). W73-02257 6E | THE PROPERTY AND ADDRESS OF THE PARTY OF THE | Applications of Agglomerate Testing to Problems in Water Resources Management, |
| Procedures for Evaluation of Water and Re- | On the Recreational Use of Domestic Water Supply Reservoirs. | W73-01965 5F |
| lated Land Resource Projects. | W73-02132 5G | Problems in the Utilization and Conservation of |
| W73-02271 6G | Cost of Public Water Service in Ohio, | Water Resources (Problemy ispol'zovaniya i okhrany vodnykh resursov). |
| What Price Water, W73-02284 6B | W73-02285 6C | W73-02061 4A |
| | Optimizing the Operation of Israel's Water System. | Disinfection of Drinking Water Containing En- |
| The Development of Israel's Water Resources, W73-02292 6B | W73-02287 6B | teroviruses with Electrolytic Products of Com- mon Salt, |
| Analysis of Actions of the United Nations | The Development of Israel's Water Resources, W73-02292 6B | W73-02089 5F |
| Seabeds Committee, | | Studies of the Effect of Desalinated Drinking |
| W73-02527 6E | Protection of Water Sources in the Lower Dnieper River Basin (Okhrana vodnykh | Water on the Functional State of the Organism, W73-02091 5F |
| VATER REUSE Reuse of Surface Runoff from Furrow Irriga- | istochnikov v basseyne Nizhnego Dnepra), W73-02329 4A | High Rate Filtration in Fairfax County, Vir- |
| tion, | | ginia, |
| W73-02118 3F | A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal | W73-02146 5F |
| Water for Industrial Needs: What, Where, When, | Water Supply, | Effect of Lime-Treated Water Upon Survival |
| W73-02139 3E | W73-02540 6A | of Bacteria, W73-02148 5F |
| On the Use of Reclaimed Wastewaters as a | The Effect of Water Resources on Industrial Growth in the Tennessee Valley Region, | |
| Public Water-Supply Source. | W73-02562 3E | What's So Great About MgCO3, W73-02219 5F |
| W73-02141 3C | WATER SUPPLY DEVELOPMENT | Leading Creek Conservancy District (Final En- |
| Great Lakes Adds New Woodroom and Fluid | Administering State Water Resources: The | vironmental Impact Statement). |
| Bed Reactor, W73-02190 5D | Need for Long Range Planning, W73-01979 6E | W73-02267 5F |
| Magnesium Bisulfite Recovery Startup, | Highland Lake Fall Creek Basin, Indiana (Draft | Microbiological Corrosion of Iron and Steel, |
| W73-02224 5D | Environmental Impact Statement). | W73-02403 8G |
| The Eyes of Texas Are on U.S. Gypsum, | W73-02253 8D | The Analytical Control of Anti-Corrosion |
| W73-02226 5D | Leading Creek Conservancy District (Final En- vironmental Impact Statement). | Water Treatment, W73-02411 5F |
| Pollution Control Shines in Chrome Chemicals | W73-02267 5F | On the Significance of Urochrome in Endemic |
| Plant, W73-02282 5G | The Development of Israel's Water Resources, | Goiter, |
| Towards Greater Water Re-Use, | W73-02292 6B | W73-02425 |
| W73-02286 5D | WATER SUPPLY SYSTEM | Kenosha Increases Plant Capacity with Micros- |
| Anion Exchange and Filtration Techniques for | Optimizing the Operation of Israel's Water System, | trainers, W73-02426 5F |
| Wastewater Renovation, | W73-02287 6B | The Effects on Man of Low Concentrations of |
| W73-02537 5D | WATER TABLE | Uranium, |
| WATER SOURCES | Water Table Fluctuations in the Meerut Dis- trict, Uttar Pradesh, India, | W73-02429 5C |
| Protection of Water Sources in the Lower Dnieper River Basin (Okhrana vodnykh | W73-02044 4B | Methodology in Establishing Water Quality |
| istochnikov v basseyne Nizhnego Dnepra), | WATER TEMPERATURE | Standards, W73-02536 5G |
| W73-02329 4A | Effects of Temperature on Osmotic and Ionic | |
| WATER STORAGE Delay of Runoff from a Glacier Basin, | Regulation in Goldfish, W73-02103 5C | Anion Exchange and Filtration Techniques for Wastewater Renovation, |
| W73-02048 2C | Thermal, Turbidity, and pH Conditions of the | W73-02537 5D |
| WATER SUPPLY | Upper White River: Sioux and Dawes Coun- | Experiences with Wastewater Disinfection in |
| Alum Creek Lake, Alum Creek, Scioto River | ties, Nebraska, W73-02151 5C | California, W73-02539 5D |
| Basin, Ohio (Draft Environmental Impact Statement). | Power Spectral Analysis of Water Temperature | |
| W73-01986 8A | Fluctuations, | WATER TYPES Subsurface Water as a Major Factor in the For- |
| Further Studies of Optimum Operation of | W73-02180 5B | mation of Landslides on the Left Bank of the |
| Desalting Plants as a Supplemental Source of | Study of the Thermal Regime of Rivers (Ob | Chirchik River (Podzemnyye vodyosnovnoy faktor formirovaniya opolzney levoberezh'ya |
| Firm Yield, W73-02082 3A | izuchenii termicheskogo rezhima rek), W73-02336 4A | Chirchika), |
| Optimum Conjunctive Use of a Dual-Purpose | Effect of Temperature on Pressure Head-Water | W73-02066 2J |
| Desalting Plant and Multi-Purpose Surface | Content Relationship and Conductivity of Two | Study of the Thermal Regime of Rivers (Ob izuchenii termicheskogo rezhima rek), |
| Water Reservoirs, W73-02083 3A | Soils, W73-02339 2G | W73-02336 4A |
| | | |

| Problems in the Utilization and Conservation o Water Resources (Problemy ispol'zovaniya | | W73-02173 2E |
|--|--|--|
| okhrany vodnykh resursov). | 1 W/3-02410 6B | An Experimental Study of Wind-Generated |
| W73-02061 4/ | Testing for and The Development of Ground Water Supplies, | Waves With and Without Pressure Gradient, W73-02346 |
| Protection of Water Sources in the Lowe | W73-02412 4B | and the same of th |
| Dnieper River Basin (Okhrana vodnyk istochnikov v basseyne Nizhnego Dnepra), | Water wells and Ground Water Contamination, W73-02413 5B | WAYNE COUNTY (MICHIGAN) River Rouge Flood Control Project, Wayn |
| W73-02329 4/ | | County, Michigan (Final Environmental Impac Statement). |
| A Water Use Map of the Great Lakes Basin, W73-02512 21 | Procedures for Installing Well Screens. W73-02415 8A | W73-02270 4/ |
| PAMPR VARAR | Place Gravel Pack Properly for Best Results. | WEATHER DATA |
| WATER VAPOR Mobilities of Injected Ions in Liquid Water, W73-02114 54 | W73-02416 8B | Weather Variations on a Mountain Grassland in Southwestern Montana, |
| W13-02114 32 | Secondary Deposition of Iron Compounds For- | W73-02568 21 |
| A Re-Examination of the Common Poor | lowing Acidizing Treatments, W73-02420 8G | WEATHER MODIFICATION Water for the West, |
| Problem, | WATER YIELD | W73-02129 61 |
| W73-01956 41 Chemical Analyses of Water from Wells i | Charakes Presetors and Handsman Counties | Design, Execution, and Results of a Mesoscal |
| Harris County, Texas, 1922-71, W73-02038 | 10X23. | Snowstorm Modification Project, W73-02483 20 |
| DOMESTIC TO SERVICE TO | Assembly Water Contest of Commonly in Maine | WELFARE ECONOMICS |
| Ground-Water Conditions in Anderson Cherokee, Freestone, and Henderson Counties | W73_00306 7C | Closing the Gap in Waste Management, W73-02215 |
| Texas. W73-02049 | WATER YIELD IMPROVEMENT | |
| W 73-02049 | The mileciace of the fier Engine weather on | WELL CASINGS |
| Development Work is Essential. | Water Quantity and Quality, W73-02116 2D | Hydraulic Properties of Perforated Well Car ings, |
| W73-02109 | | W73-02395 8 |
| Development Work is Essential. | WATERBORNE DISEASES Community Water Pollution R and D Needs. | |
| W73-02110 8 | W73-02144 5G | WELL CLEANING Maintaining Water Well Yield. |
| Water Well Hydraulics, | UL CONTRACTOR OF THE PARTY OF T | W73-02369 8 |
| W73-02370 8 | WATERCOURSES (LEGAL ASPECTS) Louisiana Irrigation and Mill Co. V. Pousson | Child and the severy party of the property |
| Notes on the Peaks History of Water Wa | (Injunctive Police to Protect and Amedian Con | WELL DATA |
| Notes on the Early History of Water-We Drilling in the United States, W73-02376 | vitude). | Chemical Analyses of Water from Wells i Harris County, Texas, 1922-71, |
| W /3-023/6 | | W73-02038 21 |
| Hydraulics of Wells, | Defending the Environment-A Case History, W73-02250 6E | Yields of Deep Sandstone Wells in orthern I |
| W73-02378 | | linois, W73-02386 3 |
| Yields of Deep Sandstone Wells in orthern I | Simulation of the Mean Performance of Mu- | |
| linois, | nicinal Waste Treatment Diants | Cable Tool Drilling, An Investigation of th |
| W73-02386 3: Effect of Well Screens on Flow Into Wells, | W/3-02212 5D | Relation Between the Natural Stroke Frequer cies of Cable-tool Systems and the Operatin |
| W73-02389 8 | WATERSHED MANAGEMENT | Strokes per Minute, W73-02407 |
| The Technical Assessed of Council Well Con | Eagle-Tumbleweed Draw Watershed, New Mexico (Draft Environmental Impact State- | W 73-02-107 |
| The Technical Aspects of Gravel Well Construction, | ment). | WELL DESIGN |
| W73-02393 8 | W73-01985 4D | Boundary Flow Considerations in the Design of Wells, |
| Boundary Flow Considerations in the Design of | Unit Plan for Management of the Hiwassee | W73-02394 8 |
| Wells, | Unit, Cherokee National Forest, Tennessee | WELL DEVELOPMENT |
| W73-02394 8 | B (Draft Environmental Impact Statement). W73-02519 4D | Judging Proper Gravel-Pack Thickness. |
| Hydraulic Properties of Perforated Well Car | | W73-02108 8 |
| ings, | WATERSHEDS (BASINS) | Development Work is Essential. |
| W73-02395 | A Program for Estimating Runoff from Indiana Watersheds, Part III Analysis of | W73-02109 8 |
| Yields of Shallow Dolomite Wells in Norther | | |
| Illinois, | tributing Area Model for Runoff Estimation, | Development Work is Essential. W73-02110 8 |
| W73-02399 | B W73-01952 2A | W /3-02110 |
| Yields of Wells in Pennsylvanian and Mississig | Annual Compilation and Analysis of Hydrolog- | Yields of Deep Sandstone Wells in orthern I |
| pian Rocks in Illinois, W73-02400 4 | ic Data for Little Elm Creek, Trinity River | linois, W73-02386 3 |
| | W73-02324 7C | Tasting for and The Davidsement of Comme |
| Electric Logging Applied to Ground Water Ex | A Mass Balance Model of Trace Metals in | Testing for and The Development of Groun Water Supplies. |
| ploration, W73-02402 86 | | W73-02412 4 |
| Well Grouting and Well Protection, | W73-02341 5B | Place Gravel Pack Properly for Best Results. |
| W73-02408 | | W73-02416 8 |
| Photographic Examination of Wells, | Edge Waves with Current Shear, | Jet Cleaning of Water Wells Described. |
| W73-02409 86 | | W73-02417 8 |
| | | |

ZONING Alternativ W73-0236

ZOOPLANI The Con Zooplank W73-0203

Zooplank W73-0244

Effects of the Phyto Population W73-0245

Quantitati the Baie-I III. Fluct Calanus, W73-02570

ZYGOPHYL

Eco-Physi Influence mination and the Po the Effect W73-02093

WELL DEVELOPMENT

| Secondary Deposition of Iron Compounds Fol- lowing Acidizing Treatments, | Whiteoak Dam and Reservoir, Whiteoak Creek | Nitrogen Fixation in Lakes, |
|--|---|---|
| W73-02420 8G | Basin, Ohio (Draft Environmental Impact | W73-02472 5C |
| WELL HYDRAULICS Water Well Hydraulics, | Statement). W73-01990 8A | WINDS An Experimental Study of Wind-Generated |
| W73-02370 8B | Local Protection and Floodproofing Project, | Waves With and Without Pressure Gradient, W73-02346 2E |
| Hydraulics of Wells, W73-02378 8B | Matewan, West Virginia, Tug Fork of Big Sandy River (Draft Environmental Impact Statement). | Winter Circulation in Lake Ontario, |
| WELL LOGS | W73-01991 8A | W73-02509 2H |
| Cable Tool Drilling, An Investigation of the Relation Between the Natural Stroke Frequen- cies of Cable-tool Systems and the Operating | WETLANDS The Influence of the New England Wetland on Water Quantity and Quality, | WINTER Winter Circulation in Lake Ontario, W73-02509 2H |
| Strokes per Minute, W73-02407 8G | W73-02116 2D | Development of Numerical Models of Lake |
| WELL LOSSES | Pave the Wetlands or Let Them Be, | Ontario, W73-02511 2H |
| Relation of Screen Design to the Design of | W73-02252 6E | WINTER WHEAT LEAVES |
| Mechanically Efficient Wells, W73-02410 8B | WHEAT | Water-Retaining Forces of the Cells of Winter |
| WELL PHOTOGRAPHY | Biological and Economic Properties of Certain Foreign Irrigated Soft Wheat Varieties, (In Bul- | Wheat Leaves and Tillering Nodes with Regard to Their Resistance to Slow Freezing and |
| Photographic Examination of Wells, W73-02409 8G | garian), W73-02004 3F | Desiccation (In Russian), W73-02123 3F |
| | | |
| WELL POINTS Testing for and The Development of Ground | WHEAT-M Water-Retaining Forces of the Cells of Winter | WISCONSIN Water Quality Management, An Analysis of In- |
| Water Supplies, W73-02412 4B | Wheat Leaves and Tillering Nodes with Regard to Their Resistance to Slow Freezing and | stitutional Patterns, W73-01978 5G |
| | Desiccation (In Russian), | |
| WELL SCREENS Judging Proper Gravel-Pack Thickness. | W73-02123 3F | Aquatic Insects of the Pine-Popple River, Wisconsin, |
| W73-02108 8B | Effect of Foliar Spray and Soil Application of CCC on Transpiration and Dry Matter Produc- | W73-02097 5C |
| Development Work is Essential. W73-02109 8B | tion of Spring Wheat, | Sediment Yields of Wisconsin Streams, W73-02152 7C |
| | W73-02499 2D | with the free way |
| Effect of Well Screens on Flow Into Wells, W73-02389 8B | WHITE AMUR The White Amur for Aquatic Weed Control, | Kenosha Increases Plant Capacity with Micros- trainers, |
| Relation of Screen Design to the Design of | W73-02010 4A | W73-02426 5F |
| Mechanically Efficient Wells, W73-02410 8B | WHITE PERCH | An Appraisal of the PCB Situation in the State of Wisconsin, |
| Procedures for Installing Well Screens. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- | W73-02447 5C |
| W73-02415 8A | icanus, W73-02273 5C | WITHDRAWAL Water Table Fluctuations in the Meerut Dis- |
| Jet Cleaning of Water Wells Described. W73-02417 8B | WHITE RIVER (NEB) | trict, Uttar Pradesh, India, |
| | Thermal, Turbidity, and pH Conditions of the | 1173 12077 |
| WELL YIELD Yields of Shallow Dolomite Wells in Northern | Upper White River: Sioux and Dawes Coun- ties, Nebraska, | WYOMING Further Ultrasonic Tracking and Tagging Stu- |
| Illinois, | W73-02151 5C | dies on Homing Cutthroat Trout (Salmo clarki) |
| W73-02399 4B | WHITE SEA | in Yellowstone Lake, W73-02577 2H |
| Yields of Wells in Pennsylvanian and Mississip- | Comparative Study of the Ecology of Free-Liv- | |
| pian Rocks in Illinois, W73-02400 4B | ing Ciliates in the Rugozersky Inlet (Kan- dalaksha Bay, White Sea), | X-RAY ANALYSIS Compositional Logging of Air-Drilled Wells, |
| WEST FORK WHITE RIVER | W73-02585 5C | W73-02377 8B |
| Economic Analyses of Optimal Water Quality Management, | WHITEOAK CREEK BASIN (OHIO) Whiteoak Dam and Reservoir, Whiteoak Creek | X-RAY FLUORESCENCE Determination of Trace Metal Pollutants in |
| W73-01951 5G | Basin, Ohio (Draft Environmental Impact Statement). | Water Resources and Sediments, W73-01958 5A |
| WEST ICE SHELF (ANTARCTICA) Reworked Palynomorphs from the West Ice | WIPT 01000 | YELLOWSTONE LAKE |
| Shelf Area, East Antarctica, and Their Possible Geological and Palaeoclimatological Sig- | WILLIAMSBURG (VIRGINIA) Polyethylene Pipe Used for 36-In Sewage Out- | Further Ultrasonic Tracking and Tagging Stu- dies on Homing Cutthroat Trout (Salmo clarki) |
| nificance, W73-02495 | fall. | in Yellowstone Lake, W73-02577 2H |
| WEST NISHNABOTNA RIVER | W73-02188 5D | YUGOSLAVIA |
| Recharge to Ground Water from the West Nishnabotna River, | WILLOW CREEK (IDAHO) Ririe Dam and Lake, Willow Creek, Idaho | Chorology, Ecology and Sociology of Chima- phila Umbellata (L.) Bart. In Slovenia (Yu- |
| W73-02033 4B | (Draft Environmental Impact Statement). W73-01988 8D | goslaviaia), W73-02272 21 |
| WEST SIBERIA | | |
| Snow Structure and Snow Regime of the West Siberian Taiga (Struktura i rezhim snezhnoy | WIND-GENERATED WAVES An Experimental Study of Wind-Generated | ZINC A Simple Apparatus for Measuring Activity |
| tolshchi zapadmosibirskoy taygi), W73-02063 2C | Waves With and Without Pressure Gradient, W73-02346 2E | Patterns of Fishes, W73-01977 5A |
| W 13-02003 | # 13-02340 ZE | W 13-01311 |

| ZONING | | | |
|-------------|----------------|---------|----------|
| Alternative | Adjustments to | Natural | Hazards, |
| | | | |

W73-02367

ZOOPLANKTON
The Contribution of Leptodora and Other
Zooplankton to the Diet of Various Fish,
9C
W73-02031
SC

Zooplankton of the Sandy Bay Area, N.J., 5C

Effects of an Organophosphorus Insecticide on the Phytoplankton, Zooplankton, and Insect Populations of Fresh-Water Ponds, W73-02453

Quantitative Fluctuations in the Zooplankton of the Baie-Des-Chalcurs (Saint-Lawrence Gulf): III. Fluctuations in Copepods Other Than Calanus, W73-02570 21.

ZYGOPHYLLUM-COCCINEUM-D Eco-Physiocloical Studies on Desert Plants: V. Influence of Soaking and Redrying on the Ger-mination of Zygophyllum Coccineum Seeds and the Possible Contribution of an Inhibitor to the Effect, 21

ABBOTT, I Induced Trout (Sa ditioning, W73-0257

The second second

.

Geochem Arab Are W73-0205

ABDULLAI Determina Yield in U W73-0200

AHLERT, I Analysis o W73-0196

Physical 1 W73-0246

Salt Pollu W73-0211

Fisheries, Sewage a W73-0243

Effect of W73-0238

The Side Log, W73-0239

ALLEE, D. Authoriza Water Re W73-0236

ALLEN, T. Multivari and Tac Phytoplar W73-0246

The Adhe and the Substance W73-0247

ANDERSO! Soil Asso Irrigation W73-0211

Diving Tomangar W73-0251

The Litt Western W73-0210

> ANDREWS Design-O Treatmen W73-0220

AUTHOR INDEX

| ABBOTT, R. R. Induced Aggregation of Pond-Reared Rainbow Trout (Salmo gairdneri) Through Acoustic Con- ditioning. | ANDREWS, J. W. Interactions of Feeding Rates and Environmental Temperature on Growth, Food Conversion, and Body Composition of Channel Caffish. | BAKER, G. E. Environments and the Distribution of Microfungi in a Hawaiian Mangrove Swamp, W73-02189 21 |
|---|---|---|
| W73-02576 81 | W73-02572 8I | BATT TW |
| ABDEL-MOGHEETH, S. M. Geochemistry of Ground Waters from Burg El- Arab Area, Egypt, | ANGEL, R. R. Volume Requirements for Air or Gas Drilling, W73-02381 | BALL, J. W. Time Stability of Aqueous APDC and Its Man- ganese and Nickel Complexes in MIBK, W73-02320 2K |
| W73-02053 2K | AREY, D. G., | BALLINGER, D. G. |
| ABDULLAEV, A. K. | Alternative Adjustments to Natural Hazards, | Laboratory Methods for the Measurement of |
| Determination of Moisture Supply and Cotton Yield in Uzbekistan, (In Russian), | W73-02367 6F | Pollutants in Water and Waste Effluents, W73-02167 5A |
| W73-02008 3F | ARGO, D. G. | BARANOWSKI, S. |
| AHLERT, R. C. | Treatment of Waste Sludges from Water Purifi- | The Origin of Fluted Moraine at the Fronts of |
| Analysis of Thermal Pollution Dispersion, | cation Plants, W73-01964 SF | Contemporary Glaciers, |
| W73-01962 5B | W13-01304 | W73-02045 2J |
| Mathematical Description of Biological and | ARMSTRONG, E. L. The Undersea Aqueduct-A New Concept in | BARBER, S. Automatic System for Monitoring Water Quali- |
| Physical Processes in Heated Streams, W73-02468 5C | Transportation, | ty, |
| W13-02-00 | W73-02076 8A | W73-02432 SA |
| AHMED, N. | ARNOLD, K. | BAREFOOT, A. D. |
| Salt Pollution of Ground Water, W73-02113 5B | Ice-Cored Moraines in Southern British Colum- bia and Alberta, Canada, | Reuse of Surface Runoff from Furrow Irriga- tion, |
| ALABASTER, J. S. | W73-02042 2C | W73-02118 3F |
| Fisheries, Cooling-Water Discharges and | | BARTOLINI, C. |
| Sewage and Industrial Wastes, W73-02433 5C | ARNTZ, W. E. Biomass and Production of Macrobenthos in the Deeper parts of Kiel Bay in 1968, | Morphology and Recent Sediments of the Western Alboran Basin in the Mediterranean |
| ALBERTSON, M. L. | W73-02094 2L | Sea, |
| Effect of Well Screens on Flow Into Wells, | ARSENOV, P. P. | W73-02494 2J |
| W73-02389 8B | The Effect of Soil and Hydrological Conditions | BASHAM, R. B. |
| ALGER, R. P. | on the Settlement and Productivity of Tree and Shrub Vegetation of Don River Floodplain, (In | The Delta-Log, a Differential Temperature Surveying Method, |
| The Sidewall Epithermal Neutron Porosity Log. | Russian), | W73-02380 8G |
| W73-02396 8G | W73-02199 4A | BASSANI, P. |
| | ARTYKOV, K. A. | Seismic Borehole Plug, |
| ALLEE, D. J. Authorization and Appropriation Processes for | Subsurface Water as a Major Factor in the For- | W73-02384 8C |
| Water Resource Development, | mation of Landslides on the Left Bank of the | BASSIN, N. J. |
| W73-02364 6E | Chirchik River (Podzemnyye vody-osnovnoy | Diffusivity of Suspended Matter in the Carib- |
| ALLEN, T. F. H. | faktor formirovaniya opolzney levoberezh'ya Chirchika). | bean Sea, W73-02171 2J |
| Multivariate Approaches to Algal Strategies | W73-02066 2J | |
| and Tactics in the Systems Analysis of | | BATANOUNY, K. H. |
| Phytoplankton, | ARVESEN, J. C. | Eco-Physiocloical Studies on Desert Plants: V. Influence of Soaking and Redrying on the Ger- |
| W73-02469 5C | Effects of Skylight Polarization, Cloudiness, and View Angle on the Detection of Oil on Water. | mination of Zygophyllum Coccineum Seeds and the Possible Contribution of an Inhibitor to |
| ALMODOVAR, L. R. The Adhesive Properties of Chlorella Vulgaris, | W73-02183 5A | the Effect, |
| and the Enhancement of This Adhesion by | | W73-02093 2I |
| Substances Found in Ambient Sea Water, | AUGUSTINUS, P. G. E. F. Some Sedimentological Aspects of the Flu- | BATURIN, G. N. |
| W73-02470 5C | vioglacial Outwash Plain Near Soesterberg | Radiometric Evidence for Recent Formation of Phosphatic Nodules in Marine Shelf Sediments. |
| ANDERSON, J. U. Soil Associations and Land Classification for | (The Netherlands), W73-02159 2J | W73-02497 2J |
| Irrigation, Socorro County, | | DATUM U D |
| W73-02117 3F | AUSNESS, R. C. Administering State Water Resources: The | BATYUK, V. P. Effect of Polymer Fertilizers on the Structural- |
| ANDERSON, R. F. | Need for Long Range Planning, | Mechanical Properties of Soil (In Russian), W73-02140 2G |
| Diving Techniques Used in the Study of Fer- | W73-01979 6E | |
| romanganese Nodule Deposits, W73-02513 2H | AX, P. | BAUMAN, D. D. Alternative Adjustments to Natural Hazards. |
| | The Principle of Dispersal of the Subterranean | W73-02367 Agustments to Natural Hazards, |
| ANDERSSON, L. | Psammon at the Transition Between Seawater | BERLEY OF THE RESERVE OF THE SECOND |
| The Littoral Vegetation at Lake Mjorn in | and Freshwater, W73-02599 2L | BAXTER, S. S. |
| Western Vastergotland, (In Swedish), W73-02104 2H | 11,5-0255 | Manager's Role in the Decision Making Process, |
| | AX, R. | W73-02127 6B |
| ANDREWS, J. F. | The Principle of Dispersal of the Subterranean | |
| Design-Operation Interactions for Wastewater Treatment Plants, | Psammon at the Transition Between Seawater and Freshwater. | BEAULIEU, A. A Water Use Map of the Great Lakes Basin, |
| W73-02209 5F | W73-02599 2L | W73-02512 2H |

BUGGIE, Toward trol Rep W73-02

BUGLEW
The Im
Eutropi
W73-02
BURKE, I
Environ
Radioac
Powere
W73-01:

BURKOV. Comparing Cili dalaksh W73-02: BURNS, J Some E Constru W73-02:

BURNS, B Virucida W73-02: BURYKIN Effect of Mechan W73-02: BUSCH, C A Portal W73-02:

BUTKUS, Biologic the Prol Ground and Typ Shoot G W73-020 BYERRUM Some St mium an Water, W73-024

Watersh ple Socia W73-023

BYERS, G. The Inflo Water Q W73-021

BYLSMA, Reservoi Records, W73-025

CAGLAR, Kinetics Oxidation W73-024

CAIRNS, J. An Ecos Virginia, W73-0197

> A Simple Patterns o W73-0197

| BEICHLEY, G. L. | BLACK, A. P. | BRETT, J. R. |
|---|---|--|
| Hydraulic Model Studies of Scoggins Dam Fish | Magnesium Carbonate: A Recycled Coagulant - | Growth Responses of Young Sockeye Salmon |
| Trap Aerator and Supply Structure, | II, | (Oncorhynchus nerka) to Different Diets and |
| W73-02069 8I | W73-02145 5F | Planes of Nutrition, |
| PRI 0 8 | Measurement of Low Turbidities, | W73-02571 8I |
| BELL, G. R. Aspects of the Characterization, Identification, | W73-02147 5A | BRIGGS, G. F. |
| and Ecology of the Bacterial Flora Associated | #15-02147 | Maintaining Water Well Yield, |
| with the Surface of Stream-Incubating Pacific | What's So Great About MgCO3, | W73-02369 8G |
| Salmon (Oncorhynchus) Eggs, | W73-02219 5F | And Arms Lavin Comment |
| W73-02565 8I | MI ACCUMENT D. D. | Water Well Hydraulics, |
| | BLACKBURN, R. D. The White Amur for Aquatic Weed Control, | W73-02370 8B |
| BELLA, D. A. | W73-02010 4A | NOTIFIED IN THE |
| Mathematical Modeling of Estuarine Benthal | 415-02010 | BRINKLEY, H. J. Temperature Tolerance and Thyroid Activity of |
| Systems, | BLONDEL, D. | the White Perch Roccus (±Morone) Amer- |
| W73-02457 5C | Contribution to the Study of Nitrogen Leaching | icanus. |
| BELYAEV, I. I. | in a Sandy Soil ('Dior') in Senegal, | W73-02273 5C |
| On the Significance of Urochrome in Endemic | W73-02161 5G | Miles and Section Control of the Control |
| Goiter, | BLOOD, W. H. | BROWN, G. W. |
| W73-02425 5F | Further Studies of Optimum Operation of | Water Temperature in the Steamboat Drainage, |
| | Desalting Plants as a Supplemental Source of | W73-02567 4C |
| BENEDICT, J. B. | Firm Yield. | BROWN TA H |
| Frost Cracking in the Colorado Front Range, W73-02043 | W73-02082 3A | BROWN, J. A. H. |
| W73-02043 2C | | Hydrologic Effects of a Bushfire in a Catchment in Southeastern New South Wales, |
| BENKO, B. | BLUMER, M. | W73-02589 4C |
| Frosthardiness of Apple Trees Scored Accord- | The West Falmouth Oil Spill. Data Available in | W 13-02365 |
| ing to the Water Retention Ability of Leaves | 1971. II. Chemistry, W73-02024 5C | BROWNE, A. K. |
| (In Czechoslovakian), | W73-02024 5C | Principles and Problems of Municipal Financ- |
| W73-02164 2D | BOCK, K. J. | ing, |
| | Toxicological Studies on Emulsions for the | W73-02289 6C |
| BENNETT, G. E. Anion Exchange and Filtration Techniques for | Combatting of Oil Pollution (Toxikologische | |
| Wastewater Renovation, | Untersuchung Von Emulgatoren Fuer Die | BROWNING, G. E. |
| W73-02537 5D | Bekaempfung Von Oelverschmutzungen), | Experiences with Wastewater Disinfection in |
| #15-0231 | W73-02281 5C | California, W73-02539 5D |
| BERST, A. H. | BOERSMA, J. R. | W 13-02339 |
| Under-Ice Observations of Wintering Sites of | | BRUCE, G. H. |
| Leopard Frogs, | Tidal Deposits and Their Sedimentary Struc- tures, | Carrying Capacity of Drilling Muds, |
| W73-02583 2C | W73-02154 2L | W73-02379 8B |
| ADDRESS D. M. | W13-02134 | |
| BERTHOUEX, P. M. Evaluating Economy of Scale, | BOGGS, J. C. | BRUNEL, P. |
| W73-02542 5D | The Need to Control Ocean Dumping, | The Gaspe Cod Ecosystem in the Gulf of St. |
| W 13-023-42 | W73-02526 6E | Lawrence: II, Weekly Fluctuations of Com- |
| BEYERS, R. J. | BOKINA, A. I. | mercial Trawl Catches of Cod With Depth and |
| Standing Crops of Elements and Atomic Ratios | Studies of the Effect of Desalinated Drinking | Temperature in 1960-1962, W73-02581 2L |
| in a Small Mammal Community, | Water on the Functional State of the Organism, | W73-02581 2L |
| W73-02584 5A | W73-02091 5F | BRYLINSKY, M. |
| BIALY, K. J. | | Release of Dissolved Organic Matter by Marine |
| Neutron Activation Analysis of Water-A | BOROVSKII, V. M. | Macrophytes, |
| Review. | Erosion and Deflation of Soils (In Russian), | W73-02100 SC |
| W73-02166 5A | W73-02163 2J | |
| | BOWEN, D. K. | BUCHANAN, B. B. |
| BIGGS, R. B. | Sediment Control, | A Regulatory Mechanism for CO2 Assimilation in Plant Photosynthesis: Activation of Ribu- |
| A Mass Balance Model of Trace Metals in | W73-02200 5G | lose-1,5-Diphosphate Carboxylase by Fructose |
| Several Delaware Watersheds-A Progress Re- | | 6-Phosphate and Deactivation by Fructose 1,6- |
| port, W73-02341 5B | BRACE, W. F. | Diphosphate, |
| W73-02341 5B | A Fracture Criterion for Brittle Anisotropic | W73-02474 5C |
| BIRD, J. M. | Rock, W73-02397 8E | |
| Cement Bond Logging, an Aid to Better | #13-0231 OE | BUCHANAN, J. D. |
| Completion Practices, | BRAINERD, J. W. | Neutron Activation Analysis of WaterA |
| W73-02385 8F | Surface Waters of a Small City (Springfield, | Review, |
| Interpretation of Townsenton I am in Water | Mass), | W73-02166 5A |
| Interpretation of Temperature Logs in Water- and Gas-Injection Wells and Gas-Producing | W73-01961 6G | BUDHRAJA, V. S. |
| Wells, | BRAMPTON, A. H. | Optimum Conjunctive Use of a Dual-Purpose |
| W73-02405 8G | Effect of Friction on Wave Shoaling, | Desalting Plant and Multi-Purpose Surface |
| | W73-02173 2E | Water Reservoirs, |
| BIRO, K. | | W73-02083 3A |
| Comparative Investigations on the Benthic | BRATSENYUK, G. N. | BURGED # B |
| Fauna at Two Sewage Inflows of Lake | Distribution of Fish in the Volgograd Reser- | BUFORD, T. B. |
| Balaton, | voir, (In Russian), | Electric Logging Applied to Ground Water Ex- |
| W73-02595 5C | W73-02591 2H | ploration, W73-02402 8G |
| BIRO, P. | BRESTERS, T. W. | |
| Comparative Investigations on the Benthic | Relation Between Anaerobic ATP Synthesis | BUGG, H. M. |
| Fauna at Two Sewage Inflows of Lake | from Pyruvate and Nitrogen Fixation in | Treatment of Waste Sludges from Water Purifi- |
| Balaton, | Azotobacter vinelandii, | cation Plants, |
| W73-02595 5C | W73-02475 5C | W73-01964 5F |

| BUGGIE, F. D. Toward Effective and Equitable Pollution Con- | CALLAWAY, R. J. Applications of Some Numerical Models to | CHITTENDEN, M. E. JR Effects of Handling and Salinity on Oxygen |
|---|--|--|
| trol Regulation, W73-02520 5G | Pacific Northwest Estuaries, | Requirements of the Striped Bass, Morone Saxatilis, |
| | W73-02456 5C | W73-02435 SC |
| BUGLEWICZ, E. G. | CAREY, A. G. JR | CHOMPARK I C |
| The Impact of Reduced Light Penetration on a Eutrophic Farm Pond, | Comparison of Benthic Infaunal Abundance on Two Abyssal Plains in the Northeast Pacific | CHOMBART, L. G. Well Logs in Carbonate Reservoirs, |
| W73-02349 5C | Ocean with Comments on Deep-Sea Food | W73-02424 4B |
| BURKE, R. D. | Sources, | CHOW, V. T. |
| Environmental Monitoring and Disposal of | W73-02017 5A | Hydrologic Modeling, |
| Radioactive Wastes from U.S. Naval Nuclear- | Techniques for Sampling Benthic Organisms, | W73-02547 2A |
| Powered Ships and Their Support Facilities, W73-01982 5B | W73-02019 7B | CHUPROVA, A. L. |
| | CARLSTON C W | The Trifolium L. Species of Pechora's Flood- |
| BURKOVSKII, I. V. Comparative Study of the Ecology of Free-Liv- | CARLSTON, C. W. Notes on the Early History of Water-Well | plain, W73-02005 3F |
| ing Ciliates in the Rugozersky Inlet (Kan- | Drilling in the United States, | |
| dalaksha Bay, White Sea), | W73-02376 8B | CIBULKA, J. J. |
| W73-02585 5C | | Resistance of Carcinogenic Organic Com- |
| WITHING I W | CARR, A. E. | pounds to Oxidation by Activated Sludge, W73-02535 5D |
| BURNS, J. W. Some Effects of Logging and Associated Road | An Estimate of Primary Productivity in a | W73-02535 5D |
| Construction on Northern California Streams, | Pennsylvania Trout Stream Using a Diurnal Oxygen Curve Technique, | CLARK, C. L. |
| W73-02573 4C | W73-02030 5A | Marine Aids to Navigation - Selection and |
| | 315 | Design, |
| BURNS, R. W. | CASSELLS, S. | W73-02463 5C |
| Virucidal Effects of Chlorine in Wastewater, W73-02538 5D | Thermal, Turbidity, and pH Conditions of the | CLARK, W. E. |
| W 73-02336 | Upper White River: Sioux and Dawes Coun- | A Polypropylene Light Trap for Aquatic Inver- |
| BURYKINA, N. K. | ties, Nebraska, W73-02151 5C | tebrates, |
| Effect of Polymer Fertilizers on the Structural- | W/3-02131 | W73-02458 7B |
| Mechanical Properties of Soil (In Russian), W73-02140 | CHALOV, P. I. | CLYDE, C. G. |
| W73-02140 2G | Radiometric Evidence for Recent Formation of | Further Studies of Optimum Operation of |
| BUSCH, C. D. | Phosphatic Nodules in Marine Shelf Sediments, | Desalting Plants as a Supplemental Source of |
| A Portable Airline to Measure Water Level, | W73-02497 2J | Firm Yield, |
| W73-02382 7B | CHAMBERLAIN, E. | W73-02082 3A |
| BUTKUS, V. F. | Frost-Heaving Pressures, | COLLINSON, J. D. |
| Biological Characteristics of Cranberries and the Problem of Their Cultivation. 1. Effect of | W73-02371 2C | Bedforms of the Tana River, Norway, W73-02047 2C |
| Ground Water Level, Sand Layer Thickness | CHAN, C. K. | COLON, E. F. |
| and Type of Peat on Rootage of Cuttings and | Evaluation of Properties of Rockfill Materials, | Estuaries, Bays and Coastal Currents Around |
| Shoot Growth, (In Lithuanian), W73-02025 3F | W73-02072 8D | Puerto Rico, |
| 117-02025 | CHANG, P. W. | W73-01974 5B |
| BYERRUM, R. U. | Significance of the Fecal Streptococci, | COLYER, J. |
| Some Studies on the Chronic Toxicity of Cad- mium and Hexavalent Chromium in Drinking | Coliform Bacteria and Coliphage in Relation- | What's So Great About MgCO3, |
| Water. | ship to Enteric Virus Pollution in Sewage and | W73-02219 5F |
| W73-02428 5C | Rivers, W73-02119 5B | CONROD, A. C. |
| nume n M | #/3-02119 | Water Quality Measurements with Airborne |
| BYERS, D. M. Watershed Project Evaluation Involving Multi- | CHAU, A. S. Y. | Multispectral Scanners, |
| ple Social Objectives, | Analysis of Chlorinated Hydrocarbon Pesti- | W73-02182 5A |
| W73-02348 6B | cides in Waters and Wastewaters, | COOK, N. G. W. |
| BVEDC C I | W73-02313 5A | Fundamentals of Rock Mechanics, |
| BYERS, G. L. The Influence of the New England Wetland on | CHEE, S. P. | W73-02372 8E |
| Water Quantity and Quality, | Sedimentation Characteristics of Gorge-Type | COOMBER, R. S. |
| W73-02116 2D | Reservoirs, | Petroleum Tanker Pollution Monitoring Unit, |
| DVI CLEA W C | W73-02179 2J | W73-02194 5A |
| BYLSMA, K. S. Reservoir Yield in Arid Regions with Limited | CHEN, G. K. C. | COON, M. D. |
| Records, | Efficiency and Utility of Collocation Methods | Model of Pressure Ridge Formation in Sea Ice, |
| W73-02545 2A | in Solving the Performance Equations of Flow | W73-02172 2C |
| CAGLAR, M. A. | Chemical Reactors with Axial Dispersion, | COSGROVE, M. H. |
| Kinetics of Bacterial Growth During Aerobic | W73-02552 5D | Cost of Public Water Service in Ohio, |
| Oxidation of Organics, | CHERKINSKII, S. N. | W73-02285 6C |
| W73-02449 5C | E. Coli as an Indicator Organism for Disinfec- | COSTA, R. R. |
| CAIRNS, J. JR | tion of Water with Respect to Enteroviruses | The Contribution of Leptodora and Other |
| An Ecosystematic Study of the South River, | Under Various Conditions, | Zooplankton to the Diet of Various Fish, |
| Virginia, | W73-02085 5F | W73-02031 5C |
| W73-01972 5C | CHISHOLM, C. H. | COTHERN, C. R. |
| A Simple Apparatus for Measuring Activity | Water Quality Changes in the Distribution | Determination of Trace Metal Pollutants in |
| Patterns of Fishes, | System, | Water Resources and Sediments, |
| W73-01977 5A | W73-02430 5F | W73-01958 5A |

DYCK, A. V Great La Bed Read W73-0219

DYUKEL', Relation Duration Carpathia ustanovie vysotoy s pat), W73-0233

Study of izuchenii W73-0233

EARLEY, J Composit W73-0237

EATON, G. Geophysical Reco Central A W73-0248

EDGERTO Microway Slicks, W73-0216

EDMUNDS Effects o perature Rainbow W73-0210 EDWARDS. Pump Ap W73-0241 EHRLICH, Density S Plate, W73-0256 EINARSEN Special A Data, W73-0238

EISLER, R. Elemental Teleost F W73-0227

Pesticide-W73-0227

EL-HINNAY Geochemi Arab Area W73-0205

ELIASSEN, Anion Ex

Wastewat W73-0253

Water De: W73-0213

ELLIOT, R. The Indus Treatment Levying S W73-0236

| COX, J. L. | DE GOELJ, J. J. M. | DMITRIYEVA, G. V. |
|---|---|--|
| DDT Residues in Coastal Marine Phytoplank- ton and Their Transfer in Pelagic Food Chains, W73-02105 5C | Automated Separations in Routine Activation Analysis of Mercury, W73-02015 5A | Bibliography on the Hydrogeology of Siberia and the Soviet Far East for the Period 1918- 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. |
| CRANCE, J. H. Description of Alabama Estuarine Areas- | Contents and Behaviour of Mercury as Compared with Other Heavy Metals in Sediments | Bibliograficheskiy ukazatel'. 1918-1965), W73-02058 2F |
| Cooperative Gulf of Mexico Estuarine Inventory, W73-02037 2L | from the Rivers Rhine and Ems, W73-02158 5B | DODDS, G. S. Mersey Kingsway Tunnel: Construction, |
| W73-02037 2L | DE GROOT, A. J. | W73-02078 8A |
| CROCKER, B. B. Trace-Quantity Engineering, W73-02028 5A | Contents and Behaviour of Mercury as Com- pared with Other Heavy Metals in Sediments from the Rivers Rhine and Ems, | DOLAN, J. P. Special Application of Drill-Stem Test Pressure Data. |
| CROWE, C. W. | W73-02158 5B | W73-02383 8G |
| Secondary Deposition of Iron Compounds Fol- lowing Acidizing Treatments, W73-02420 8G | DE RAAF, J. F. M. Tidal Deposits and Their Sedimentary Struc- tures, | DOLL, H. G. Filtrate Invasion in Highly Permeable Sands, |
| CSALLANY, S. | W73-02154 2L | W73-02422 8B |
| Yields of Deep Sandstone Wells in orthern Il- linois, | DEARINGER, J. A. Evaluating Recreational Potential of Small | DONCHEVA, I. Biological and Economic Properties of Certain |
| W73-02386 3B | Streams, | Foreign Irrigated Soft Wheat Varieties, (In Bulgarian), |
| Yields of Shallow Dolomite Wells in Northern | W73-02297 6B DEL VALLE, L. A. | W73-02004 3F |
| Illinois, W73-02399 4B | Determination of the Rate of Biodegradation in | DOODY, J. J. |
| Yields of Wells in Pennsylvanian and Mississip- | Some Polluted Tropical Waters and in Some Types of Liquid Wastes Common in Puerto | Water Economics, W73-02543 4B |
| pian Rocks in Illinois, | Rico, | |
| W73-02400 4B | W73-01973 5B | DOUGLAS, J. Evaluation of a Winter Steelhead Fishery on a |
| CULVER, R. H. | DELLAH, A. | Western Washington River, |
| Influence of Stream Quality Standards on Pota- ble Quality, Need for Standards, | Concentration of Brines by Spray Evaporation, W73-02081 5E | W73-02575 8I |
| W73-02130 5G | | DOWNING, T. N. |
| CUMMINS, K. W. | DELLEUR, J. W. A Program for Estimating Runoff from Indiana | Analysis of Actions of the United Nations |
| The Contribution of Leptodora and Other Zooplankton to the Diet of Various Fish, W73-02031 5C | Watersheds, Part III Analysis of Geomorphologic Data and a Dynamic Con- tributing Area Model for Runoff Estimation, | Seabeds Committee, W73-02527 6E |
| DANILIN, A. I. | W73-01952 2A | DOWNS, A. Up and Down with EcologyThe 'Issue-Atten- |
| Radioisotope Investigation Techniques in En- | DEMPSTER, G. R. JR | tion Cycle', W73-02259 6G |
| gineering Geology and Hydrogeology (Radioizotopnyye metody issledovaniya v inz- henernoy geologii i gidrogeologii), | Annual Compilation and Analysis of Hydrolog- ic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, | DOWNS, J. M. |
| W73-02328 8G | W73-02482 7C | Soil Associations and Land Classification for Irrigation, Socorro County, |
| DARMER, K. I. A Summary of Peak Stages and Discharges in | Radionuclides in Transport in the Columbia | W73-02117 3F |
| New York for the Flood of June 1972, | River from Pasco to Vancouver, Washington, W73-02022 5B | DROWN, D. B. |
| W73-02492 2E | DERKACHENKO, V. I. | Pollution and the Ecology of Nearshore Periphyton of Lake Superior: The Effects of |
| DAS, H. A. Determination of Manganese, Copper, and Iron | Protection of Water Sources in the Lower Dnieper River Basin (Okhrana vodnykh | Calefaction on Periphyton, |
| in Human Blood by Neutron Activation Analy- | istochnikov v basseyne Nizhnego Dnepra), | W73-02556 5C |
| sis, W73-02018 5A | W73-02329 4A | DUBINCHUK, V. T. Radioisotope Investigation Techniques in En- |
| DAUGHTREY, K. R. | DEWBRE, J. Inventory of Water Diversions and Rate Struc- | gineering Geology and Hydrogeology |
| An Automated System for Determining | tures for Cities, Towns, and Villages in New | (Radioizotopnyye metody issledovaniya v inz- henernoy geologii i gidrogeologii), |
| Estuarine Bathymetry, W73-02317 7B | Mexico, W73-01963 6C | W73-02328 8G |
| DAVENPORT, S. P. JR | DHOND, R. V. | DUCSIK, D. W. |
| Pave the Wetlands or Let Them Be, W73-02252 6E | Anion Exchange Equilibria Involving Phosphate, Sulphate and Chloride, | The Crisis in Shoreline Recreation, W73-02302 6G |
| DAVIS, D. E. | W73-02208 5D | The Framework for Analysis, |
| Nutrient Removal by Waterhyacinth, W73-02122 5G | Wastewater Treatment by Ion Exchange, W73-02202 5D | W73-02300 6G |
| DAVIS, E. H. | DICKSON, K. L. | Offshore Siting of Electric Power Plants, W73-02301 6G |
| Rate of Settlement Under Two- and Three- | An Ecosystematic Study of the South River, | Water Quality Improvement in Boston Harbor, |
| Dimensional Conditions, W73-02075 8D | Virginia, W73-01972 5C | W73-02303 6G |
| DAVIS, S. N. | DILLON, E. L. | DUNLAP, D. V. |
| Initiation of Ground-Water Flow in Jointed Limestone, | Recent Federal Policies Affecting Marine Science and Engineering Development, | Meteorological and Hydrological Analysis of the August 27-28, 1971, New Jersey Flood, |
| W73-02375 4B | W73-02466 5C | W73-02174 2A |

W73-02375

| DYCK, A. W. J. | ELLIOTT, A. C. | FAVIN, S. |
|---|--|---|
| Great Lakes Adds New Woodroom and Fluid | Regeneration of Steelworks Hydrochloric Acid | Density Stratified, Viscous Flow Past a Flat |
| Bed Reactor, W73-02190 5D | Pickle Liquor, W73-02198 5D | Plate, W73-02563 8B |
| W/3-02190 | | W 73-02363 |
| DYUKEL', N. G. | ELLIOTT, R. D. | FEDERER, C. A. |
| Relation of Ice Freezeup Dates and Ice-Cover | The Effects of Sewer Surcharges on the Level | Solar Radiation Absorption by Leafless Hard- |
| Duration to Elevation and Channel Slopes of | of Industrial Wastes and the Use of Water by | wood Forests, |
| Carpathian Rivers (O svyazi srokov | Industry, W73-02115 5G | W73-02569 21 |
| ustanovleniya i prodoizhitel'nosti ledostava s | W/3-02113 | FEINSTEIN, D. L. |
| vysotoy mestnosti i uklonami na rekakh Kar- | EMERY, A. R. | Multiple Scattering of Laser Light from Turbid |
| pat), W73-02337 4A | Under-Ice Observations of Wintering Sites of | Water, |
| W73-02337 4A | Leopard Frogs, | W73-02181 5B |
| Study of the Thermal Regime of Rivers (Ob | W73-02583 2C | W 15 02101 |
| izuchenii termicheskogo rezhima rek), | EPSTEIN, S. | FENLON, M. W. |
| W73-02336 4A | On the Use of Stable Isotopes to Trace the | Transport in the Baroclinic Coastal Current |
| | Origins of Ice in a Floating Ice Tongue, | Near the South Shore of Lake Ontario in Early |
| EARLEY, J. W. | W73-02168 2C | Summer, |
| Compositional Logging of Air-Drilled Wells, | | W73-02510 2H |
| W73-02377 8B | ERICKSON, L. E. | FERRONSKIY, V. L. |
| EATON, G. P. | Efficiency and Utility of Collocation Methods | Radioisotope Investigation Techniques in En- |
| Geophysical, Geohydrological, and Geochemi- | in Solving the Performance Equations of Flow | gineering Geology and Hydrogeology |
| cal Reconnaissance of the Luke Salt Body, | Chemical Reactors with Axial Dispersion, | (Radioizotopnyye metody issledovaniya v inz- |
| Central Arizona, | W73-02552 5D | henernoy geologii i gidrogeologii), |
| W73-02480 2F | Modeling and Analysis of Washout in Tower | W73-02328 8G |
| | Fermentation Processes, | |
| EDGERTON, A. T. | W73-02554 5D | FERTUCK, L. |
| Microwave Emission Characteristics of Oil | | Computing Salinity Profiles in Ice, |
| Slicks, | Modeling and Optimization of a Tower-Type | W73-02054 2C |
| W73-02162 5A | Activated Sludge System, | |
| | W73-02553 5D | FIDDES, D. |
| EDMUNDSON, E. H., JR | ERUSSALIMOV, P. | Representative Rural Catchments in Kenya and |
| Effects of Acute Gamma Radiation and Tem- | The Influence of Post-Irrigation Soil Cultiva- | Uganda, |
| perature on Growth and Survival of Juvenile | tions on the Sugar Beet Yield, (In Bulgarian), | W73-02050 2A |
| Rainbow Trout (Salmo Gairdneri), | W73-02003 3F | FIELD, R. JR |
| W73-02102 5C | | Regional Government in New England: A |
| EDWARDS, T. W. | ESPINOSA, L. R. | Prototype, |
| Pump Application Engineering, | A Polypropylene Light Trap for Aquatic Inver- | W73-02304 6G |
| W73-02414 8C | tebrates, | |
| | W73-02458 7B | FILTEAU, G. |
| EHRLICH, L. W. | ETHRIDGE, D. | Quantitative Fluctuations in the Zooplankton of |
| Density Stratified, Viscous Flow Past a Flat | User Charges as a Means for Pollution Control: | the Baie-Des-Chaleurs (Saint-Lawrence Gulf): |
| Plate, | The Case of Sewer Surcharges, | III. Fluctuations in Copepods Other Than |
| W73-02563 8B | W73-02359 5G | Calanus, |
| MINIA POPULA CI A | and the later of the | W73-02570 2L |
| EINARSEN, C. A. | EUNPU, F. F. High Rate Filtration in Fairfax County, Vir- | FLANDERS, A. F. |
| Special Application of Drill-Stem Test Pressure Data, | ginia, | Hydrologic Data Collection Via Geostationary |
| W73-02383 8G | W73-02146 5F | Satellite, |
| W 75-02363 | W/3-02140 | W73-02036 7A |
| EISLER, R. | FADEEVA, V. K. | |
| Elemental Composition of the Estuarine | Effect of Drinking Water with Different | FOGG, G. E. |
| Teleost Fundulus Heteroclitus (L.), | Chloride Contents on Experimental Animals, | Nitrogen Fixation in Lakes, |
| W73-02278 5C | (In Russian), | W73-02472 5C |
| | W73-02020 5C | POLCED D W |
| Pesticide-Induced Stress Profiles, | Studies of the Effect of Desalinated Drinking | FOLGER, D. W. |
| W73-02274 5C | Water on the Functional State of the Organism, | Characteristics of Estuarine Sediments of the United States, |
| EL-HINNAWI, E. E. | W73-02091 5F | W73-02481 2L |
| Geochemistry of Ground Waters from Burg El- | 1175 02071 | W /3-02461 2L |
| Arab Area, Egypt, | FAIR, J. R. | FORSGATE, J. A. |
| W73-02053 2K | Trace-Quantity Engineering, | Representative Rural Catchments in Kenya and |
| 1175 02005 | W73-02028 5A | Uganda, |
| ELIASSEN, R. | FAN, L. T. | W73-02050 . 2A |
| Anion Exchange and Filtration Techniques for | Efficiency and Utility of Collocation Methods | |
| Wastewater Renovation, | in Solving the Performance Equations of Flow | FOULDS, J. M. |
| W73-02537 5D | Chemical Reactors with Axial Dispersion, | What's it all About. Algae, |
| W. D. W. D | W73-02552 5D | W73-02187 5G |
| Water Desalting, Present and Future, | | FRANZOY, C. E. |
| W73-02131 3A | Modeling and Analysis of Washout in Tower | A Portable Airline to Measure Water Level, |
| ELLIOT, R. D. | Fermentation Processes, | W73-02382 7B |
| The Industrial Demand for Water and Waste | W73-02554 5D | H 13-02302 /B |
| Treatment in Selected U.S. Cities Which are | Modeling and Optimization of a Tower-Type | FRATE, A. |
| Levying Surcharges, | Activated Sludge System, | Frost-Heaving Pressures, |
| W72.02261 5G | W72.02553 5D | W73_02371 2C |

HALL, F. The Inf Water (W73-02

HAM, H. Water w W73-024 HAM, R. Applicate Problem W73-019 HAMADA

The Hy Sagitta I of App Japanese W73-025

HAMBLIN An Inve Lake Or W73-025 HAMILTO Sound A W73-024 HAMPSON The Wes W73-020 HAMPTO Annual ic Data Basin, T W73-023 HANNAH, Measure W73-021 HANSEN, Environ Hygiene W73-021 HANSEN, The Elec Ground W73-023 HANTUSH Hydraul W73-023 HARBOE,

Optimum Desalting Water Re W73-020

HARGOVI Alternati Agriculta W73-023 HARGRAV Oxidatio centratio Sedimen W73-024 HARIDAS Effect of

Content Soils, W73-023

| FREEBURG, J. A. Automatic System for Monitoring Water Quali- | GENTRY, J. B. Standing Crops of Elements and Atomic Ratios | GRIGORE, S. Aquatic and Marsh Vegetation of the Timis- |
|--|--|---|
| ty, W73-02432 5A | in a Small Mammal Community, W73-02584 5A | Bega Interfluvial Zone, W73-02316 4A |
| FREEMAN, A. M. III | GIANELLI, W. R. | GRIMES, K. G. |
| | | A Shallow Artesian Aquifer in the Tertiary |
| Clean Rhetoric and Dirty Water, W73-02260 6E | Water for the West, W73-02129 6D | Deposits of Southern Cape York Peninsula, W73-02309 4B |
| FRIDAY, J. | GIAQUINTO, A. R. | 170 00007 |
| Crest-Stage Gaging Stations in OregonA Com- | Structural Aspects of Amide-Water Systems, | GRING, D. M. |
| pilation of Peak Data Collected from October | | Biological Effects of Trinitrotoluene (TNT), |
| 1952 to September 1972, | W73-02343 5A | W73-02101 5C |
| W73-02034 7C | GLASBY, G. P. | GRIPPAUDO, G. |
| FUKUHARA, H. | Direct Observations of Columnar Scattering | Alternatives for Fluoridation of Aqueducts (In |
| Note on the Swimming Behavior of | Associated with Geothermal Gas Bubbling in | Italian). |
| Chironomus Plumosus Larvae in Lake Suwa, | the Bay of Plenty, New Zealand, | W73-02160 > 5G |
| (In Japanese), | W73-02052 2L | |
| W73-02586 2H | OI OCOCTORIENT M | GRUBBE, N. H. |
| 1175 02500 | GLOGOCZOWSKI, M. | Legal Protection of the Pacific Northwest |
| FUNGAROLI, A. A. | Recent Sediments of the Central California | Estuaries, |
| Pollution of Subsurface Water by Sanitary | Continental Shelf-Pillar Point to Pigeon Point: | W73-02459 5C |
| Landfills. Vol 2, | Part B. Mineralogical Data, | |
| W73-02106 5B | W73-02319 2J | GRUEV, TSANKO |
| . 35 | | Effect of Mineral Fertilizers and Irrigation on |
| Pollution of Surface Water by Sanitary Land- | GONCHAROV, V. S. | the Yields of Basic Crops, (In Russian), |
| fills. Vol 3. | Radioisotope Investigation Techniques in En- | W73-02007 3F |
| W73-02107 5B | gineering Geology and Hydrogeology | |
| *************************************** | (Radioizotopnyye metody issledovaniya v inz- | GUBARENKO, N. A. |
| GABRYSCH, R. K. | henernoy geologii i gidrogeologii), | Effect of Donetsk Mineral Water on the Clini- |
| Chemical Analyses of Water from Wells in | W73-02328 8G | cal Course of Chronic Cholangiohepatitis, (In |
| Harris County, Texas, 1922-71, | | Russian). |
| W73-02038 2K | GONET, O. | W73-02002 5C |
| | Introduction to Study of the Chemical Relation- | |
| GALLUSI, G. | ships Between the Sediments on the Bottom | GUBERGRITS, A. Y. |
| Alternatives for Fluoridation of Aqueducts (In | and the Water of the Lake of Geneva, | Effect of Donetsk Mineral Water on the Clini- |
| Italian), | W73-02592 5C | cal Course of Chronic Cholangiohepatitis, (In |
| W73-02160 5G | | Russian), |
| | GONSIOR, M. J. | W73-02002 5C |
| GARDNER, R. B. | Investigation of Slope Failures in the Idaho | |
| Investigation of Slope Failures in the Idaho | Batholith. | GUPTA, K. B. |
| Batholith, | W73-02564 2J | Applications of Agglomerate Testing to |
| W73-02564 2J | | Problems in Water Resources Management, |
| | GOOLSBY, J. L. | W73-01965 5F |
| GARLAND, J. H. N. | A Proven Squeeze-Cementing Technique in a | |
| Fisheries, Cooling-Water Discharges and | Dolomite Reservoir, | GUPTA, R. K. |
| Sewage and Industrial Wastes, | W73-02421 8F | Ecology of Jalore District in Western |
| W73-02433 5C | | Rajasthan, |
| | GOTZOVA, V. | W73-02600 4A |
| GARMATZ, E. A. | Biological and Economic Properties of Certain | CURRENT P |
| Oil Pollution Act Amendments of 1972 (H.R. | Foreign Irrigated Soft Wheat Varieties, (In Bul- | GURMAN, R. |
| 15627), | garian), | Toward Effective and Equitable Pollution Con- |
| W73-02528 6E | W73-02004 3F | trol Regulation, |
| CARRISON C B | ** | W73-02520 5G |
| GARRISON, C. B. | GOW, A. J. | GUYMON, G. L. |
| The Effect of Water Resources on Industrial | On the Use of Stable Isotopes to Trace the | Note on the Finite Element Solution of the Dif- |
| Growth in the Tennessee Valley Region, | Origins of Ice in a Floating Ice Tongue, | |
| W73-02562 3E | W73-02168 2C | fusion-Convection Equation, W73-02338 2E |
| GARRISON, E. J. | | W73-02338 2E |
| Power Spectral Analysis of Water Temperature | GRANATSTEIN, V. L. | GUYOD, H. |
| Fluctuations, | Multiple Scattering of Laser Light from Turbid | Electrical Well Logging Fundamentals, |
| | Water. | W73-02392 8B |
| W73-02180 5B | W73-02181 5B | 11.5-02572 OD |
| GATEHOUSE, H. C. E. | | HAAKER, H. |
| The Ministry's Memorandum on 'Standards of | GRANVILLE, R. A. | Relation Between Anaerobic ATP Synthesis |
| Effluents to Rivers With Particular Reference | Towards Greater Water Re-Use, | from Pyruvate and Nitrogen Fixation in |
| to Industrial Effluents': A Review, | W73-02286 5D | Azotobacter vinelandii, |
| W73-02228 5G | | W73-02475 5C |
| | GRASSLE, J. F. | |
| GEBHART, L. R. | The West Falmouth Oil Spill. I. Biology, | HALE, A. M. |
| Drilling and Grouting Experiences in Un- | W73-02023 5C | Experimental Investigation of the Spatial Form |
| derground Construction, | | of Large Internal Waves in a Near-Shore Re- |
| W73-02070 8A | GREGORY, J. | gion of Lake Huron, |
| 0.1 | Anion Exchange Equilibria Involving | W73-02506 2H |
| GEHIN, C. | Phosphate, Sulphate and Chloride, | |
| Morphology and Recent Sediments of the | W73-02208 5D | HALL, D. O. |
| Western Alboran Basin in the Mediterranean | | Ponderosa Pine Planting Techniques, Survival |
| Sea, | Wastewater Treatment by Ion Exchange, | and Height Growth in the Idaho Batholith, |
| W73-02494 2J | W73-02202 5D | W73-02579 4A |

Sea, W73-02494

| HALL, F. R. The Influence of the New England Wetland on | HARRIS, D. H. Assessment of Turbidity, Color, and Odor in | HERINGTON, J. R. A Theoretical Study of the Pressures Acting on |
|---|--|---|
| Water Quantity and Quality, W73-02116 2D | Water, W73-01971 5G | a Rigid Wall by a Sloping Earth or Rock Fill, W73-02077 8D |
| HAM, H. H. | HARRIS, J. E. | HERMAN, S. S. |
| Water wells and Ground Water Contamination, W73-02413 5B | Diffusivity of Suspended Matter in the Caribbean Sea, | Zooplankton of the Sandy Bay Area, N.J., W73-02448 5C |
| | W73-02171 2J | |
| HAM, R. K. | TARRES D. W. | HICKERSON, L. H. |
| Applications of Agglomerate Testing to Problems in Water Resources Management, W73-01965 5F | HARRIS, R. H. Kinetics of Biologically Mediated Aerobic Oxidation of Organic Compounds in Receiving | Resistance of Carcinogenic Organic Compounds to Oxidation by Activated Sludge, W73-02535 5D |
| HAMADA, T. | Waters and in Waste Treatment, W73-02450 5C | HICKS, T. G. |
| The Hydrological Conditions for the Entry of | W 13-02430 | Pump Application Engineering, |
| Sagitta Enflata Into Osaka Bay: II. In The Case | HART, I. C. | W73-02414 8C |
| of Appearance of a Cold Water Mass (In | Fisheries, Cooling-Water Discharges and | 117-02-14 |
| Japanese), | Sewage and Industrial Wastes, | HILL, G. A. |
| W73-02587 2L | W73-02433 5C | Special Application of Drill-Stem Test Pressure Data. |
| HAMBLIN, P. F. | HARTUNG, W. H. | W73-02383 8G |
| An Investigation of Horizontal Diffusion in | Development of a Tape Transport Bacterial De- | |
| Lake Ontario, W73-02507 2H | tection System; Final Report, W73-02012 5A | HILL, H. R. Observations of Declining Water Lettuce Popu- |
| HAMILTON, E. L. | HARWARD, M. E. | lations in Lake Izabal, Guatemala, |
| Sound Attenuation in Marine Sediments, | Hills Creek Reservoir Turbidity Study, | W73-02549 2H |
| W73-02467 2J | W73-02092 5C | HILSENHOFF, W. L. |
| 1175 02101 | 117502072 | Aquatic Insects of the Pine-Popple River, |
| HAMPSON, G. R. | HATTEN, J. III | Wisconsin. |
| The West Falmouth Oil Spill. I. Biology, | Studies of Saprolite and Its Relation to the | W73-02097 5C |
| W73-02023 5C | Migration and Occurrence of Groundwater in | |
| HAMPTON B B | Crystalline Rocks, | HIMMELBLAN, D. M. |
| HAMPTON, B. B. Annual Compilation and Analysis of Hydrolog- | W73-01955 2F | Modeling and Sensitivity Analysis for Planning |
| ic Data for Little Elm Creek, Trinity River | HAUSHILD, W. L. | Decisions in Water Resources Expansion, |
| Basin, Texas, 1970, | Radionuclides in Transport in the Columbia | W73-02541 4A |
| W73-02324 7C | River from Pasco to Vancouver, Washington, | HINDALL, S. M. |
| | W73-02022 5B | Sediment Yields of Wisconsin Streams, |
| HANNAH, S. A. | | W73-02152 7C |
| Measurement of Low Turbidities, | HAVEMAN, R. H. | |
| W73-02147 5A | Clean Rhetoric and Dirty Water, W73-02260 6E | HOADLEY, A. W. |
| HANSEN, C. A. | W 73-02200 0E | A Study of the Effects of Island Development |
| Environmental Control Administration Water | HAYES, G. S. | on Lake Water Quality, |
| Hygiene Programs, | Average Water Content of Snowpack in Maine, | W73-01954 5C |
| W73-02125 5G | W73-02326 7C | HODGKISS, W. |
| HANSEN, H. J. | HEADY, E. O. | Aspects of the Characterization, Identification, |
| The Electric Log: Geophysics' Contribution to | Alternative Demands for Water and Land for | and Ecology of the Bacterial Flora Associated |
| Ground Water Prospecting and Evaluation, | Agricultural Purposes, | with the Surface of Stream-Incubating Pacific |
| W73-02373 · 4B | W73-02363 6D | Salmon (Oncorhynchus) Eggs, |
| | | W73-02565 8I |
| HANTUSH, M. S. | HEANEY, J. P. | HOEDE, D. |
| Hydraulics of Wells, | A Water Quality Model for a Conjunctive Sur- | Determination of Manganese, Copper, and Iron |
| W73-02378 8B | face-Groundwater System: An Overview, W73-02178 5B | in Human Blood by Neutron Activation Analy- |
| HARBOE, R. C. | W13-02176 | sis, |
| Optimum Conjunctive Use of a Dual-Purpose | HEATH, R. A. | W73-02018 5A |
| Desalting Plant and Multi-Purpose Surface | Circulation and Hydrology Under the Seasonal | HOEKSTRA. P. |
| Water Reservoirs, | Ice in McMurdo Sound, Antarctica, | Frost-Heaving Pressures, |
| W73-02083 3A | W73-02051 2C | W73-02371 2C |
| HARGOVE, S. H. | HEISE, J. J. | |
| Alternative Demands for Water and Land for | Transition Metals of Impounded Waters, | HOFFMAN, R. A. |
| Agricultural Purposes, | W73-01953 5B | Effect of Animal Wastes Applied to Soils on |
| W73-02363 6D | WINT DOORS IN | Surface and Ground Water Systems, W73-01960 5B |
| HADODANE B.T. | HELFGOTT, T. | W73-01960 5B |
| HARGRAVE, B. T. Oxidation-Reduction Potentials, Oxygen Con- | Measures of Organic Pollutants in Wastewater Treatment Plant Operations, | HOOPER, W. F., |
| centration and Oxygen Uptake of Profundal | W73-02334 5D | Compositional Logging of Air-Drilled Wells, |
| Sediments in a Eutrophic Lake, | | W73-02377 8B |
| W73-02451 5C | HENRIKSSON, E. | HOOFFRIG C P |
| | Algal Nitrogen Fixation in Temperate Regions, | HOSKINS, G. E. |
| HARIDASAN, M. | W73-02471 5C | Aspects of the Characterization, Identification, and Ecology of the Bacterial Flora Associated |
| Effect of Temperature on Pressure Head-Water | HENSON, B. L. | with the Surface of Stream-Incubating Pacific |
| Content Relationship and Conductivity of Two Soils, | Mobilities of Injected Ions in Liquid Water, | Salmon (Oncorhynchus) Eggs, |
| W73-02339 2G | W73-02114 5A | W73-02565 8I |

KARAPET

Quantita the Prod Bays of sian), W73-025

KARR, M. Effects Resource Estuaries W73-024

KARROW, New Evi W73-0250 KAZAKOV Effect of (Cu, Me Metaboli W73-0200

KEEF, R. C Magnesia W73-022

KELLING, Sediment tivity, St W73-024

KEMP, E. Reworke Shelf Are

Geologic nificance W73-024

KENYON, Edge Wa W73-021

Bibliogra and the 1965 (Gie Bibliogra W73-020

KERR, J. A Prelimina bility, W73-025

Water Q surement W73-024

KIEV, G. I A Metho plex Eco W73-020

KING, C. A Feedback W73-020

KING, P. I Treatmen cation Pl W73-019

KLEIN, G. Hydrauli Migratio W73-024

| HOUSTON, C. W. Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, W73-02449 5C | Authorization and Appropriation Processes for Water Resource Development, W73-02364 6E | Effect of Temperature on Pressure Head-Water Content Relationship and Conductivity of Two Soils, W73-02339 2G |
|--|--|--|
| HOWARD, J. Y. | IONESCU-TECULESCU, V. | W/3-02339 20 |
| Proposed Experimental Programs for Testing Remote Sensor Applications in the | Records About Ecology of Some Characeae Species from the Floodplain of the Danube, (In Rumanian). | JOHNSON, G. V. Evaluation of a Turfgrass-Soil System to Util- ize and Purify Waste Water, |
| Metropolitan Washington Area, W73-02491 7B | W73-02249 2I | W73-02440 5B |
| HSIEH, Y.P. A Source Study of the Suspended Solids in the | ISRAELSEN, E. K. A Hybrid Computer Program for Predicting the Chemical Quality of Irrigation Return Flows, | Groundwater Recharge and Quality Transformations During Initiation and Management of a |
| Gallatin River, W73-G2559 5B | W73-02177 5B | New Stabilization Lagoon, W73-02439 5B |
| | IVAKHNENKO, O. G. | JOHNSON, H. T. |
| HUANG, Y. H. Finite Element Analysis of Flow Toward Artesian Well. | A Method of Mathematical Modeling of Com- plex Ecological Systems, W73-02032 5B | The Mexican Water Treaty and its Relationship to Colorado River Water Supplies, |
| W73-02340 2F | OLD STATE OF THE S | W73-02529 5G |
| HUBER, W. C. A Water Quality Model for a Conjunctive Surface-Groundwater System: An Overview, W73-02178 5B | IWAI, S. The Hydrological Conditions for the Entry of Sagitta Enflata Into Osaka Bay: II. In The Case of Appearance of a Cold Water Mass (In Japanese), | JOHNSON, K. G. Floods in the Aguadilla-Aguada Area, Northwestern Puerto Rico, W73-02327 7C |
| | W73-02587 2L | JOHNSON, W. C. |
| HUGHES, T. C. A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal | JAEGER, J. C. Fundamentals of Rock Mechanics, | The Forest Overstory Vegetation on the Mis- souri River Floodplain in North Dakota, |
| Water Supply, | W73-02372 8E | W73-02185 4A |
| W73-02540 6A HUNGERFORD, J. J. | Shear Failure of Anistropic Rocks, W73-02374 8E | JONES, J. R. An Experiment in Modeling Rocky Mountain |
| Diatoms from Seven Iowa Rivers, W73-02011 2I | JALURIA, Y. Thermal Effects of Power Plants on Lakes, | Forest Ecosystems, W73-02566 2A |
| HUNT, J. N. | W73-02068 2H | JONES, J. W. |
| Effect of Friction on Wave Shoaling, | JAMES, L. D. | The Effect of Water Level Fluctuations on a Littoral Fauna, |
| W73-02173 2E | Nonparametric Statistical Methods in Urban Hydrologic Research, | W73-02477 5C |
| HUNT, P. C. | W73-02175 4C | JONES, P. H. |
| The Effect of Water Level Fluctuations on a Littoral Fauna. | JANOWITZ, G. S. | Electric Logging Applied to Ground Water Ex- |
| W73-02477 SC | The Coastal Boundary Layers of a Lake, W73-02508 2H | ploration, W73-02402 8G |
| HUNTER, R. W. | | JONES, R. E. |
| Practical Experience in the use of Polyelectrolytes, | JEBENS, J. Phosphorus Removal in Trickling Filters, W73-02220 5D | Conference Report on the Federal Water Pollu- tion Control Act Amendments of 1972, |
| W73-02203 5D | | W73-02530 5G |
| HURLBERT, S. H. Effects of an Organophosphorus Insecticide on | JEFFREY, R. F. Effect of Animal Wastes Applied to Soils on Surface and Ground Water Systems, | JOVET, P. Ecological Observations on Soldanella Villosa |
| the Phytoplankton, Zooplankton, and Insect Populations of Fresh-Water Ponds, W73-02453 5C | W73-01960 5B JEFFRIES, H. P. | Darracq, W73-02217 |
| HURR, R. T. | Chemical Responses by Marine Organisms to Stress, Stress in Hard Clams from a Polluted | JUNGERIUS, P. D. The Effects of Selective Erosion by Overland |
| A New Approach for Estimating Transmissi- bility From Specific Capacity, | Estuary, W73-01975 5C | Flow on the Ice-Pushed Ridges of Uelsen (County Bentheim, Germany), |
| W73-02398 8B | JEKEL, P. | W73-02157 2J |
| HUSBAND, W. H. W. Computing Salinity Profiles in Ice, | Transport in the Baroclinic Coastal Current Near the South Shore of Lake Ontario in Early | KAENDLER, R. Investigations on the Loading of the Untertrave |
| W73-02054 2C | Summer, W73-02510 2H | with Sewage, (In German), |
| HUTCHINSON, F. E. | JENNE, E. A. | W73-02016 5C |
| Effect of Animal Wastes Applied to Soils on Surface and Ground Water Systems, W73-01960 5B | Time Stability of Aqueous APDC and Its Man- ganese and Nickel Complexes in MIBK, | KAHLE, R. L. Water and Sewage Sludge Absorption by Solid Waste. |
| ICHIYE, T. | W73-02320 2K | W73-02191 5D |
| Diffusivity of Suspended Matter in the Caribbean Sea, | JENNINGS, M. E. Flow Routing Models for Stream System Stu- | KARAKI, S. Concentration of Brines by Spray Evaporation, |
| W73-02171 2J | dies, W73-02176 2E | W73-02081 5E |
| INGHRAM, E. C. | JENSEN, O. F. JR | KARAM, W. G. |
| The World's Deepest Cable Tool Well, W73-02388 8B | Photographic Examination of Wells, W73-02409 8G | 15 Towns Join Hands, W73-02223 5D |
| | | 1 |

| KARAPETYAN, T. S. | KLIMCZYK-JANIKOWSKA, M. | KROON, J. J. |
|--|---|---|
| Quantitative Description of the Initial Links of | Dace (Leuciscus Leuciscus L.) from the Upper | Determination of Manganese, Copper, and Iron |
| the Production Process in the Shallow-Water Bays of the Posiet Bau (Japanses Sea), (In Rus- | Vistula and Czarna Przemsza, W73-02090 2I | in Human Blood by Neutron Activation Analy- sis, |
| sian), | | W73-02018 5A |
| W73-02597 5C | KLINGEMAN, P. C. Hills Creek Reservoir Turbidity Study, | KRUGLITSKII, N. N. |
| KARR, M. H. | W73-02092 5C | Effect of Polymer Fertilizers on the Structural- |
| Effects of Institutional Constraints and | KODAIRA, K. | Mechanical Properties of Soil (In Russian), W73-02140 2G |
| Resources Planning on Growth in and Near Estuaries. | Under-Ice Observations of Wintering Sites of | |
| W73-02465 5C | Leopard Frogs, | KRUMBEIN, W. C. Field Mapping and Computer Simulation of |
| KARROW, P. F. | W73-02583 2C | Braided-Stream Networks, |
| New Evidence for Spencer's Laurentian River, | KOERNER, R. M. | W73-02490 2J |
| W73-02505 2H | Some Observations on Superimposition of Ice | KUDEL'SKAYA, G. A. |
| KAZAKOV, A. M. | on the Devon Island Ice Cap, N.W.T., Canada, W73-02046 2C | Effect of Polymer Fertilizers on the Structural- Mechanical Properties of Soil (In Russian). |
| Effect of Dietry Deficiency of Trace Elements | | W73-02140 2G |
| (Cu, Mo, Mn) on Water and Electrolyte Metabolism, | KOLOMYTS, E. G. Snow Structure and Snow Regime of the West | KUENEN, PH. H. |
| W73-02086 5C | Siberian Taiga (Struktura i rezhim snezhnoy | Tentative Data on Flow Resistance in Suspen- |
| KEEF, R. C. | tolshchi zapadmosibirskoy taygi), | sion Currents, |
| Magnesium Bisulfite Recovery Startup. | W73-02063 2C | W73-02156 2J |
| W73-02224 5D | KONONENKO, N. I. | KUFLIKOWSKI, T. |
| KELLING, G. | Annual Streamflow Fluctuations in the Dni- ester River Basin (Kolebaniya godovogo stoka | Overgrowing of the Dam Reservoir at Goczal- kowice in the Years 1967-1969, |
| Sedimentary Evidence of Bottom Current Ac- | rek basseyna Dnestra), | W73-02088 2H |
| tivity, Strait of Gibraltar Region, W73-02496 21 | W73-02335 4A | KUMAGAL J. S. |
| W73-02496 2J | KOONCE, J. F. | Phenol Sorption by Activated Carbon and |
| KEMP, E. M. | Multivariate Approaches to Algal Strategies | Selected Macroporous Resins, W73-02206 5D |
| Reworked Palynomorphs from the West Ice Shelf Area, East Antarctica, and Their Possible | and Tactics in the Systems Analysis of Phytoplankton, | |
| Geological and Palaeoclimatological Sig- | W73-02469 5C | KURTZ, D. A. Accumulations of Certain Pesticides in Adipose |
| nificance, | KOPPA, YU. V. | Tissues and Performance of Angus, Hereford |
| W73-02495 2J | A Method of Mathematical Modeling of Com- | and Holstein Steers Fed Apple Processing |
| KENYON, K. E. | plex Ecological Systems, | Wastes, W73-02204 5C |
| Edge Waves with Current Shear, W73-02170 2E | W73-02032 5B | KUSHNIRENKO, S. V. |
| W13-02110 2E | KORKMAN, J. | After Effect of Atmospheric Drought of |
| KENZINA, V. L. | Survival and Leaching of Fecal Streptococci Under Field Conditions, | Coupling of Oxidation and Phosphorylation |
| Bibliography on the Hydrogeology of Siberia and the Soviet Far East for the Period 1918- | W73-02143 5B | Processes in the Leaves of Bean Plants with Different Drought-Resistance (In Russian), |
| 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | PORMAC I | W73-02134 3F |
| Bibliograficheskiy ukazatel'. 1918-1965), W73-02058 2F | KORNAS, J. Tsuga Heterophylla Forest at Lake McDonald, | KVIKLITE, R. Y. |
| | Glacier National Park, U.S.A., and its | Biological Characteristics of Cranberries and |
| KERR, J. A. Preliminary Analysis of Surface Water Availa- | Phytogeography, W73-02201 4A | the Problem of Their Cultivation. 1. Effect of Ground Water Level, Sand Layer Thickness |
| bility, | | and Type of Peat on Rootage of Cuttings and |
| W73-02544 4A | KOSIK, J. | Shoot Growth, (In Lithuanian), W73-02025 3F |
| KEYSER, A. H. | Changes of Soil Moisture Under Lucerne and Maize Stands Grown for Green Mass (In | |
| Water Quality Characteristics and Their Mea- | Czech), | LA BAR, G. W. Further Ultrasonic Tracking and Tagging Stu- |
| surement, W73-02427 5A | W73-02142 2G | dies on Homing Cutthroat Trout (Salmo clarki) |
| W73-02427 5A | KOVACIK, T. L. | in Yellowstone Lake, |
| KIEV, G. P. A Method of Mathematical Modeling of Com- | Information on the Velocity and Flow Pattern of Detroit River Water in Western Lake Erie | W73-02577 2H |
| plex Ecological Systems, | Revealed by an Accidental Salt Spill, | LACROIX, G. Quantitative Fluctuations in the Zooplankton of |
| W73-02032 5B | W73-02057 5B | the Baie-Des-Chaleurs (Saint-Lawrence Gulf): |
| KING, C. A. M. | KOZHEMYACHENKO, E. A. | III. Fluctuations in Copepods Other Than |
| Feedback Relationships in Geomorphology, | The Effect of Some Meteorological Factors on | Calanus, W73-02570 2L |
| W73-02040 2J | Buckwheat Yield, (In Russian), W73-02006 3F | LAISK, A. |
| KING, P. H. | | Diffusion Resistance of Leaves in Connection |
| Treatment of Waste Sludges from Water Purifi- | KOZITSKAYA, V. N. Characterization of Phenols in Areas of Water | with their Anatomy (In Russian), |
| cation Plants, W73-01964 5F | 'Blooming' in Open Bodies of Water, | W73-02133 2I |
| | W73-02460 5C | LAMARCHE, V. C. JR |
| KLEIN, G. DEV. Hydraulic Parameters Controlling Bedform | KRIZ, G. J. | Recent Climatic Change and Development of the Bristlecone Pine (P. Longaeva Bailey) |
| Migration on an Intertidal Sand Body, | Drain and Irrigate with the Same System, | Krummholz Zone, Mt. Washington, Nevada, |
| W73-02489 2L | W73-02353 3F | W73-02169 4A |

| LANGE, G. R. Rotary Drilling and Coring in Permafrost: Part | Modeling and Optimization of a Tower-Type Activated Sludge System, | LOMONOSOV, I. S. Bibliography on the l |
|--|--|--|
| III. Deep Core Drilling, Core Analysis and | W73-02553 5D | and the Soviet Far E |
| Bore Hole Thermometry at Cape Thompson, | LEE, T. M. | 1965 (Gidrogeologiya S |
| Alaska, W73-02312 8B | Management Problems in Flood Plain Areas, | Bibliograficheskiy uka W73-02058 |
| W73-02312 8B | W73-02288 6F | |
| LANGE, O. L. | | LONG, L. L. |
| The Functional Adaptation of Lichens to | LEE, T. R. | Power Spectral Analyse Fluctuations, |
| Ecological Conditions of Arid Areas, W73-02193 2I | A Water Use Map of the Great Lakes Basin, W73-02512 2H | W73-02180 |
| | | LONGRIDGE, J. L. |
| ANGELIER, W. F. The Analytical Control of Anti-Corrosion | LEE, W. F. | Aquatic Insects of |
| Water Treatment, | Cost of Public Water Service in Ohio, W73-02285 6C | Wisconsin, |
| W73-02411 5F | W 73-02265 | W73-02097 |
| LARKIN, P. A. | LENNOX, D. H. | LOVEJOY, E. M. P. |
| Simulation Studies of the Adams River | Readers Comment on Step Drawdown Test, | Wisconsin Boulder F |
| Sockeye Salmon (Oncorhynchus nerka), | W73-02419 8G | Implications, Frankli |
| W73-02580 8I | LESSIG, A. | County, Texas, W73-02487 |
| AROCHE, G. | Industrial Waste and the Small City. | |
| Elemental Composition of the Estuarine | W73-02214 5D | LOVTSEVICH, E. L. |
| Teleost Fundulus Heteroclitus (L.), | LEVINE, A. M. | Disinfection of Drinki teroviruses with Elect |
| W73-02278 5C | Multiple Scattering of Laser Light from Turbid | mon Salt, |
| LAVSON, D. W. | Water, | W73-02089 |
| Hills Creek Reservoir Turbidity Study, | W73-02181 5B | E. Coli as an Indicato |
| W73-02092 5C | LEVY, Y. | tion of Water with I |
| LEE, B. K. H. | A Simple Device for the Sorting of Living | Under Various Condit |
| Environments and the Distribution of | Planktonic Copepods, | W73-02085 |
| Microfungi in a Hawaiian Mangrove Swamp, W73-02189 | W73-02598 7B | LUGOVAYA, T. V. |
| W/3-02169 21 | LEWIS, C. F. M. | Pike Rations in the Kr |
| LEE, G. F. | Seismic Profiling and Geology of the Toronto | Russian), W73-02596 |
| An Appraisal of the PCB Situation in the State | Waterfront Area of Lake Ontario, W73-02501 2H | |
| of Wisconsin, W73-02447 5C | W/3-02301 ZH | LUND, B. G. A. |
| | LEWIS, D. | Reservoir Yield in An Records, |
| Chemical Aspects of Bioassay Techniques for | The Eyes of Texas Are on U.S. Gypsum, | W73-02545 |
| Establishing Water Quality Criteria, W73-02446 5A | W73-02226 5D | LUTHIN, J. C. |
| | LEWIS, S. M. | Rate Design and Cost |
| Role of Phosphorus in Eutrophication and Dif- fuse Source Control. | Researchers Seek Ways to Lower Costs of Un- | W73-02298 |
| W73-02478 5C | derground Transmission Systems, W73-02074 8C | LUTIN, P. A. |
| | W/3-020/4 | Resistance of Carci |
| Ways in Which a Resident of the Madison | LI, P. H. | pounds to Oxidation b |
| Lakes' Watershed may Help to Improve Water Quality in the Lakes, | The Influence of a Short Period of Evaporative | W73-02535 |
| W73-02479 5C | Cooling on the Distribution of 14C in Potato Plants, | LYAKHNOVICH, V. P. |
| DE C PRED | W73-01969 3F | Feeding, Dietary Inter |
| Chlorobiphenyls (PCBs) in the Milwaukee | | the Effectiveness o |
| River, | LIANG, H. C. An Experimental Study of Wind-Generated | Resources in Natural Byelorussian Polesya. |
| W73-02084 . 5C | Waves With and Without Pressure Gradient, | Lakes, |
| LEE, L. K. | W73-02346 2E | W73-02590 |
| A Theoretical Study of the Pressures Acting on | LIVSHIN, A. Z. | LYNCH, S. |
| a Rigid Wall by a Sloping Earth or Rock Fill, | Water-Retaining Forces of the Cells of Winter | Regional Governmen |
| W73-02077 8D | Wheat Leaves and Tillering Nodes with Regard | Prototype, |
| LEE, J. | to Their Resistance to Slow Freezing and | W73-02304 |
| Recent Sediments of the Central California | Desiccation (In Russian), W73-02123 3F | LYNN, R. I. |
| Continental Shelf-Pillar Point to Pigeon Point: Part B. Mineralogical Data, | | Water Quality of Hyra |
| W73-02319 2J | LOCKETT, J. B. | ship to Algal Blooms, W73-02121 |
| | Historical Changes of Estuarine Topography | 4 |
| LEE, M. T. A Program for Estimating Runoff from Indiana | With Question Of Future Management Policies, W73-02464 5C | LYUTIK, P. M. |
| Watersheds, Part III Analysis of | | Investigation of the I Storm Runoff in the C |
| Geomorphologic Data and a Dynamic Con- | LOF, GEORGE O. G. | issledovanii skoroste |
| tributing Area Model for Runoff Estimation, | Concentration of Brines by Spray Evaporation, | livnevykh vod v Karpa |
| W73-01952 2A | W73-02081 5E | W73-02334 |

LOFGREEN, H. A. JR

W73-02550

Economic Analysis of Alternative Water Pollu-

tion Control Measures,

Hydrogeology of Siberia East for the Period 1918-Sibiri i Dal'nego Vostoka. azatel'. 1918-1965), sis of Water Temperature 5B the Pine-Popple River, 5C low and Its Geomorphic in Mountains, El Paso 21 ing Water Containing Entrolytic Products of Com-5F or Organism for Disinfec-Respect to Enteroviruses ions. 5F remenchung Reservoir (In 2H rid Regions with Limited 2A of Service, 6C

MACUNE

MAHER, Testing Water S

W73-02

W73-025 MAKER,

Soil As Irrigatio W73-021

MAKKAV A Dictio

MALANE

MALLON,

MALONE Adminis Need for

W73-019

MANAHAI

Heavy with Syr gent Pho W73-021

Toxicolo Combatt Untersuc

Bekaemp W73-022 MARACHI Evaluation W73-020

MARLIER

MASCLET

MASSEY, I Annual C ic Data f

Texas, M W73-0248

MATHUR,

Water Ta

W73-0204

The Con W73-025

5C

The Pond W73-0259

Propose Metropo W73-024

Resistan pounds 1 W73-025

Geology geologii) W73-020

MAJERUS The Re Decreas

The De veying MADSEN Alterna Agricul W73-02

inogenic Organic Com-by Activated Sludge, 5D MANN, H. rrelationships of Fish and of Their Use of Food I Bodies of Water in the II. Diet of Goldfish in

nt in New England: A 6G um Lake and Its Relation-

Rates and Traveltime of Carpathians (K voprosu ob sy i vremeni dobeganiya atakh), W73-02334 4A

MACKAY, W. C. Effects of Temperature on Osmotic and Ionic Regulation in Goldfish, W73-02103 5C

LEE, S. S.

W73-02554

Modeling and Analysis of Washout in Tower Fermentation Processes,

| MACUNE, C. W. | MATSUURA, T. | MENDIRATTA, A. K. |
|--|--|--|
| The Delta-Log, a Differential Temperature Sur- | Studies on Reverse Osmosis for Water Pollu- | Nonlinear Optimal Control Theory Applied to a |
| veying Method, | tion Control, | Distributed Feed Biochemical River Reactor |
| W73-02380 8G | W73-02225 5D | with Dual Water Quality and Self Purification |
| different to a contract of the | 10 M 11 X X X X X X X X X X X X X X X X X | Restraints. |
| MADSEN, H. C. | MAXWELL, J. C. | W73-02352 5G |
| Alternative Demands for Water and Land for | Power Spectral Analysis of Water Temperature | |
| Agricultural Purposes, | Fluctuations, | MERKULOVA, K. I. |
| W73-02363 6D | W73-02180 5B | Radiometric Evidence for Recent Formation of |
| A CONTRACTOR OF THE PARTY OF TH | 35 | Phosphatic Nodules in Marine Shelf Sediments, |
| MAHER, E. J. | MAYLATH, R. E. | W73-02497 21 |
| Testing for and The Development of Ground | Monitoring New York's Water Automatically, | |
| Water Supplies, | W73-02135 5G | MERTENS, P. |
| W73-02412 4B | W13-02133 | Offshore Siting of Electric Power Plants, |
| | MAZUROWSKI, M. J. | W73-02301 6G |
| MAJERUS, M. E. | Multiple Scattering of Laser Light from Turbid | |
| The Response of Root and Shoot Growth to | | MIADOK, D. |
| Decreases in Soil Water Potential, | Water, | Vegetation of the Area of the Future Reservoir |
| W73-02558 2I | W73-02181 5B | on the Klenovaka Rimava, |
| MANUEL II I | MGIPOO G P | W73-02087 2I |
| MAKER, H. J. | MCADOO, G. D. | 11 15 02001 |
| Soil Associations and Land Classification for | Chemical Analyses of Water from Wells in | MICHEWICZ, J. E. |
| Irrigation, Socorro County, | Harris County, Texas, 1922-71, | The White Amur for Aquatic Weed Control, |
| W73-02117 3F | W73-02038 2K | W73-02010 4A |
| 8.0 A SPEC A SECRETARY A A | | W 13-02010 |
| MAKKAVEYEV, A. A. | MCCLANAHAN, M. A. | MIKHAILOVA, T. N. |
| A Dictionary of Hydrogeology and Engineering | A Study of the Effects of Island Development | Distribution of the Water Chestnut Trapa |
| Geology (Slovar' po gidrogeologii i inzhenernoy | on Lake Water Quality, | |
| geologii), | W73-01954 5C | natans L. s. l. in the Floodplains of Bodies of |
| W73-02064 10A | 113-01334 | Water in the Vladimir Oblast and Their |
| BLACT WARM | MCCLEAVE, J. D. | Hydrochemical Characterization, (In Russian), |
| MALANEY, G. W. | Further Ultrasonic Tracking and Tagging Stu- | W73-02000 2I |
| Resistance of Carcinogenic Organic Com- | | |
| pounds to Oxidation by Activated Sludge, | dies on Homing Cutthroat Trout (Salmo clarki) | MIKHAL'SKAYA, L. D. |
| W73-02535 5D | in Yellowstone Lake, | Storm Runoff Coefficients for Rivers of the |
| | W73-02577 2H | Ukraine and Moldavia (Koeffitsiyenty stoka |
| MALLON, H. J. | | dozhdevykh pavodkov na rekakh Ukrainy i |
| Proposed Experimental Programs for Testing | MCCLOY, J. M. | Moldavii), |
| Remote Sensor Applications in the | Hydrometeorological Relationships and Their | W73-02333 4A |
| Metropolitan Washington Area, | Effects on the Levees of a Small Arctic Delta, | |
| W73-02491 7B | W73-02041 8D | MILANE, M. P. |
| | Address of the second second | Environmental Quality. A Challenge for |
| MALONEY, F. E. | MCCUEN, R. H. | Achievement. |
| Administering State Water Resources: The | Nonparametric Statistical Methods in Urban | W73-02485 5G |
| Need for Long Range Planning, | Hydrologic Research, | 11 13-02-103 |
| W73-01979 6E | W73-02175 4C | MILES, M. E. |
| | #15-0a115 | Environmental Monitoring and Disposal of |
| MANAHAN, S. E. | MCDIFFETT, W. F. | Radioactive Wastes from U.S. Naval Nuclear- |
| Heavy Metal Ion Interaction and Transport | | Powered Ships and Their Support Facilities, |
| with Synthetic Complexing Agents and Deter- | An Estimate of Primary Productivity in a | W73-01982 5B |
| gent Phosphate Substitutes in Aquatic Systems, | Pennsylvania Trout Stream Using a Diurnal | W /3-01762 3B |
| W73-02112 5A | Oxygen Curve Technique, | MILLARD, J. P. |
| Wisconia | W73-02030 5A | Effects of Skylight Polarization, Cloudiness, |
| MANN, H. | Ulassian and the second | and View Angle on the Detection of Oil on |
| Toxicological Studies on Emulsions for the | MCERLEAN, A. J. | |
| | | |
| | Temperature Tolerance and Thyroid Activity of | Water, |
| Combatting of Oil Pollution (Toxikologische | Temperature Tolerance and Thyroid Activity of | |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die | | Water, W73-02183 5A |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- | Water, W73-02183 5A MILLER, J. C. |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds-A Progress Re- |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds-A Progress Re- |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds-A Progress Re- port, W73-02341 5B |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 5B MINOGUE, J. E. |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Re- port, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New Hope Rivers, |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02539 5D | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New Hope Rivers, W73-02356 SA |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipita- | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Amer- icanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02539 5D MCLEAN, E. O. | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Report, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02336 5A |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Report, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02336 5A |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipita- | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02339 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Re- port, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroin- vertebrates from the Lower Haw and New Hope Rivers, W73-02356 SA |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 5C MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 2K | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02336 MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 SA |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 BD MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 MASSEY, B. C. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 MASSEY, B. C. Annual Compilation and Analysis of Hydrolog- | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02339 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 5A MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 5C MOBASHERI, F. |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 SC MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 2K MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02539 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. Microwave Emission Characteristics of Oil | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Report, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02336 5A MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 5C MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 SC MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 2K MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. Microwave Emission Characteristics of Oil Slicks, | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 AMIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface Water Reservoirs, |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, W73-02482 7C | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02539 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. Microwave Emission Characteristics of Oil | Water, W73-02183 5A MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware WatershedsA Progress Report, W73-02341 5B MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02336 5A MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 5C MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 MARLIER, G. The Ponds of the Soignes Forest, W73-02593 MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 2K MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, W73-02482 MATHUR, R. N. | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-02539 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. Microwave Emission Characteristics of Oil Slicks, W73-02162 5A | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 MIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface Water Reservoirs, W73-02083 3A |
| Combatting of Oil Pollution (Toxikologische Untersuchung Von Emulgatoren Fuer Die Bekaempfung Von Oelverschmutzungen), W73-02281 MARACHI, N. D. Evaluation of Properties of Rockfill Materials, W73-02072 8D MARLIER, G. The Ponds of the Soignes Forest, W73-02593 4A MASCLET, A. The Content of Various Elements in Precipitation, W73-02588 MASSEY, B. C. Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, W73-02482 7C | Temperature Tolerance and Thyroid Activity of the White Perch Roccus (±Morone) Americanus, W73-02273 5C MCKENZIE, J. C. Mersey Kingsway Tunnel: Construction, W73-02078 8A MCLAREN, F. R. Experiences with Wastewater Disinfection in California, W73-0239 5D MCLEAN, E. O. Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B MEEKS, D. Microwave Emission Characteristics of Oil Slicks, | Water, W73-02183 MILLER, J. C. A Mass Balance Model of Trace Metals in Several Delaware Watersheds—A Progress Report, W73-02341 MINOGUE, J. E. Heavy Metal Analyses of Freshwater Macroinvertebrates from the Lower Haw and New Hope Rivers, W73-02356 AMIYAZAKI, S. Metabolism of DDT by Fresh Water Diatoms, W73-02280 MOBASHERI, F. Optimum Conjunctive Use of a Dual-Purpose Desalting Plant and Multi-Purpose Surface Water Reservoirs, |

O'HARA A Rep Green W73-0

OKO, M The I Micell W73-0

OKUN, I Region Waste W73-0

OLAH, J Compo Fauna Balato W73-0

Week! Phytog and in W73-0. O'LAOG Model: Decisie W73-0.

OL'KHO Bibliog and th 1965 (C Bibliog W73-0

OLNEY, Transf ments W73-0

OLSON, Polluti Periph Calefa W73-0

Taxon Superi W73-0 OLVER, Treatm cation W73-0

ORME, / Field Braide W73-0

OSTREM Ice-Co bia and W73-07

OSTRY, Hydror Draina Ontario W73-02

OTLEY, A Mas Severa port, W73-02

| MOGG, J. L. | MUIRHEAD-THOMSON, R. C. | NEUMANN, K. E. |
|--|---|---|
| Maintaining Water Well Yield, | Pesticides and Freshwater Fauna, | Analysis of Residual Total Nitrogen in Waste- |
| W73-02369 8G | W73-02098 5B | waters, W73-02345 5A |
| The Technical Aspects of Gravel Well Con- | MULLA, M. S. | |
| struction, W73-02393 8A | Effects of an Organophosphorus Insecticide on the Phytoplankton, Zooplankton, and Insect | Measures of Organic Pollutants in Wastewater Treatment Plant Operations, |
| Anna Santa and Anna Santa and Anna Santa and Anna Santa and Anna a | Populations of Fresh-Water Ponds, | W73-02334 5D |
| Water Well Hydraulics, W73-02370 8B | W73-02453 5C | NEVORAL V |
| 100000000000000000000000000000000000000 | MURRAY, R. B. | NEVORAL, V. The Determination of Traces of Cobalt and of |
| MOKLYAK, V. I. Runoff Coefficients for Areas Between | Water Quality of Hyrum Lake and Its Relation- | Nickel in Mineral Waters, |
| Isochrones (O koeffitsiyentakh yestestvennogo | ship to Algal Blooms, W73-02121 5C | W73-02071 2K |
| zaregulirovaniya stoka na mezhizokhronnykh uchastkakh). | | NICOL, K. J. |
| W73-02331 4A | MURRAY, S. N. Studies on Algal Growth, Development, and | Alternative Demands for Water and Land for |
| MONAGAN, J. S. | Reproduction, | Agricultural Purposes, W73-02363 6D |
| Repair and Protect Our Natural Environment, | W73-02099 5C | |
| W73-01993 6E | NAFTEL, W. L. | NIFLAND, G. O. |
| MONKS, J. G. | Chemical Analyses of Water from Wells in | Contribution to the Ecology of Cirsium Pa- lustre (L.) Scop. |
| Objectives of Water Resource Management - | Harris County, Texas, 1922-71, | W73-02279 21 |
| Can They Be Achieved Through Legislation, W73-02561 6E | W73-02038 2K | NOEL, P. |
| | NAGEL, W. A. | Hydrobiological Research on Amsterdam |
| MONTGOMERY, H. A. C. A Method for Isolating Suspended Solids from | The Sidewall Epithermal Neutron Porosity Log, | Island: 1969-1970 Exploratory Campaign, |
| Sewage Effluents for Measurement of Oxygen | W73-02396 8G | W73-02582 21 |
| Demand, | NACW CHRISTIANS | NOLAN, T. J. III |
| W73-02207 5D | NAGY, CHRISTIANE, The Content of Various Elements in Precipita- | Secondary Depostion of Iron Compounds Fol- |
| MOONEY, H. A. | tion, | lowing Acidizing Treatments, W73-02420 86 |
| Recent Climatic Change and Development of the Bristlecone Pine (P. Longaeva Bailey) | W73-02588 2K | W 73-02420 |
| Krummholz Zone, Mt. Washington, Nevada, | NAJARIAN, T. | NOVIKOV, Y. U. |
| W73-02169 4A | Water Quality Improvement in Boston Harbor, | The Effects on Man of Low Concentrations of Uranium. |
| MOORE, E. J. | W73-02303 6G | W73-02429 50 |
| Cement Bond Logging, an Aid to Better | NARF, R. P. | MILL II D |
| Completion Practices, W73-02385 8F | Aquatic Insects of the Pine-Popple River, | NULL, H. R. Trace-Quantity Engineering, |
| MOODE P F | Wisconsin, W73-02097 5C | W73-02028 5A |
| MOORE, F. K. Thermal Effects of Power Plants on Lakes, | | NUNNALLY, N. R. |
| W73-02068 2H | NEBOL'SINA, T. K. Distribution of Fish in the Volgograd Reser- | Bibliography of Remote Sensing for Planning |
| MOORE, W. W. | voir, (In Russian), | and Administrative Studies, |
| How to Dull a Bit for Fun and Profit, | W73-02591 2H | W73-02305 7E |
| W73-02387 8G | NEILL, G. | NYLUND, R. E. |
| MORIWAKI, H. | Offshore Siting of Electric Power Plants, | The Influence of a Short Period of Evaporative |
| The Hydrological Conditions for the Entry of Sagitta Enflata Into Osaka Bay: II. In The Case | W73-02301 6G | Cooling on the Distribution of 14C in Potato Plants. |
| of Appearance of a Cold Water Mass (In | NEKHAEVA, T. I. | W73-01969 3I |
| Japanese), | Feeding, Dietary Interrelationships of Fish and the Effectiveness of Their Use of Food | Influence of Mist Irrigation on Growth, Yields |
| W73-02587 2L | Resources in Natural Bodies of Water in the | and Quality of Potatoes and Snap Beans, |
| MORSE, R. JR Regional Government in New England: A | Byelorussian Polesya. II. Diet of Goldfish in | W73-01966 3E |
| Prototype, | Lakes, W73-02590 2H | The Influence of Mist Irrigation on the Potato |
| W73-02304 6G | Characteristics with the LANCE Francisco | II. Growth and Development, |
| MOSS, M. E. | NELSON, H. R. JR Irrigation ManagementA Tool for Agribusi- | W73-02441 31 |
| Serial-Correlation Structure of Discretized | ness, | The Influence of Mist Irrigation on the Potato |
| Streamflow, W73-02323 2E | W73-02546 3F | III. Nutrient Content of Leaves, |
| | NELSON, J. L. | W73-02442 |
| MUCKLESTON, K. W. The Problems and Issues of Implementing Na- | Radionuclides in Transport in the Columbia | The Influence of Mist Irrigation on the Potate |
| tional Water Legislation at Subnational Levels, | River from Pasco to Vancouver, Washington, | IV. Tuber Quality Factors, W73-01968 |
| W73-02242 6E | W73-02022 5B | |
| MUEGGLER, W. F. | NELSON, O. F. | ODLAUG, T. O. Pollution and the Ecology of Nearshorn |
| Weather Variations on a Mountain Grassland in | Kenosha Increases Plant Capacity with Micros- trainers. | Periphyton of Lake Superior: The Effects of |
| Southwestern Montana, W73-02568 2B | W73-02426 5F | Calefaction on Periphyton, |
| | NELSON, R. R. | W73-02556 50 |
| MUELLER, J. E. Re-evaluation of the Relationship of Master | Taxonomy of North Shore Periphyton, Lake | Taxonomy of North Shore Periphyton, Lake |
| Streams and Drainage Basins, | Superior, Castle Danger Studies 1970-1971, W73-02555 5C | Superior, Castle Danger Studies 1970-1971, W73-02555 |
| Tr / 301/888 21 | TT (.3*U&3.3.3 | |

| O'HARA, N. W. | OTTO, L. | PHILLIPS, R. A. |
|--|--|---|
| A Regional Geophysical Investigation of the Green Bay Area, W73-02502 2H | The Frequency Distribution of the Current Speed at the Netherlands Lightvessels and Its Possible Influence on the Composition of Sedi- | Groundwater Recharge and Quality Transfor- mations During Initiation of a New Sewage Sta- bilization Pond (and Management), |
| AND 14 H | ments in the Southern North Sea, | W73-02438 5B |
| OKO, M. U. The Effects of Divalent Metal Ions on the | W73-02155 2J | PICKETT, G. R. |
| Micellar Properties of Sodium Dodecyl Sulfate, W73-02557 2K | OYA, V. Diffusion Resistance of Leaves in Connection | The Use of Acoustic Logs in the Evaluation of Sandstone Reservoirs, |
| 1170 3200 | with their Anatomy (In Russian), | W73-02401 8G |
| OKUN, D. A. | W73-02133 2I | |
| Regional Management of Water Supply and | PALANGE, R. C. | PIERRE, J. F. |
| Wastewater Disposal Facilities, W73-02354 6B | Wastewater Treatment Works Planning, Economics and Technology-Some New | Hydrobiological Research on Amsterdam Island: 1969-1970 Exploratory Campaign, |
| OLAH, J. | Directions, | W73-02582 2I |
| Comparative Investigations on the Benthic | W73-02296 5D | PLJANOWSKI, B. S. |
| Fauna at Two Sewage Inflows of Lake | PAL'MOVA, L. A. | A Quantitative Evaluation of Dissolved Oxygen |
| Balaton, | On the Significance of Urochrome in Endemic | Instrumentation, |
| W73-02595 5C | Goiter. | W73-02165 5B |
| Weekly Changes of the Bacterio- and | W73-02425 5F | PODSKOCHII, I. I. |
| Phytoplankton Standing Stock in Lake Balaton | name a | Methods of Relief Studies for Evaluation of the |
| and in the Highly Eutrophic Lake Belso, | PARK, J. Objectives of Water Resource Management - | Potential Danger of Water Erosion of Soils (In |
| W73-02594 5C | Can They Be Achieved Through Legislation, | Russian), |
| OH ACCHAINE D. T. | W73-02561 6E | W73-02128 2J |
| O'LAOGHAIRE, D. T. Modeling and Sensitivity Analysis for Planning | | POLF'OROV, B. V. |
| Decisions in Water Resources Expansion, | PARKER, B. W. | The Effect of Fertilizers on Seed Production of |
| W73-02541 4A | Automatic System for Monitoring Water Quali- | Irrigated Alfalfa. (In Ukrainian), |
| | ty, W73-02432 5A | W73-01997 3F |
| OL'KHOVIK, L. M. | W15-02-02 | |
| Bibliography on the Hydrogeology of Siberia | PARMERTER, P. R. | POLTA, R. C. |
| and the Soviet Far East for the Period 1918- 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. Bibliograficheskiy ukazatel'. 1918-1965), | Model of Pressure Ridge Formation in Sea Ice, W73-02172 2C | Control of Nitrate Contamination of Ground Water Associated with Land Disposal of Mu- nicipal Sewage, |
| W73-02058 2F | PASKAUSKY, D. F. | W73-02111 5B |
| | Winter Circulation in Lake Ontario, | |
| OLNEY, C. E. | W73-02509 2H | POLYAKOV, V. A. |
| Transfer of Pesticides Through Water, Sedi- | PATEL, V. C. | Radioisotope Investigation Techniques in En- |
| ments and Aquatic Life, W73-01959 5B | A Unified View of the Law of the Wall Using Mixing-Length Theory, | gineering Geology and Hydrogeology (Radioizotopnyye metody issledovaniya v inz- |
| OLSON, T. A. | W73-02306 8B | henernoy geologii i gidrogeologii), W73-02328 8G |
| Pollution and the Ecology of Nearshore | | 117502520 |
| Periphyton of Lake Superior: The Effects of | PAULSON, A. S. | PONYI, J. E. |
| Calefaction on Periphyton, | The Effect of Water Resources on Industrial Growth in the Tennessee Valley Region, | Comparative Investigations on the Benthic |
| W73-02556 5C | W73-02562 3E | Fauna at Two Sewage Inflows of Lake Balaton, |
| Taxonomy of North Shore Periphyton, Lake | | W73-02595 5C |
| Superior, Castle Danger Studies 1970-1971, | PENNINGTON, J. V. | |
| W73-02555 5C | Some Results of Dri Investigations-Rock Failure in Percussion, | POSKITT, F. F. |
| ALTER LAN | W73-02406 8E | The Asphaltic Lining of Dungonnel Dam, |
| OLVER, J. W. Treatment of Waste Sludges from Water Purifi- | 117702700 | W73-02073 8A |
| cation Plants, | PEREZ, A. L. | POTTS, J. R. |
| W73-01964 5F | A Water Quality Model for a Conjunctive Sur- | Optical Signatures of the Near-Shore Waters of |
| | face-Groundwater System: An Overview, W73-02178 5B | Southern Monterey Bay, |
| ORME, A. R. | | W73-02027 5A |
| Field Mapping and Computer Simulation of Braided-Stream Networks. | PETERSEN, J. S. | POULOS, H. G. |
| W73-02490 2J | Effect of Well Screens on Flow Into Wells, | Rate of Settlement Under Two- and Three- |
| | W73-02389 8B | Dimensional Conditions, |
| OSTREM, G. | PETERSON, D. L. | W73-02075 8D |
| Ice-Cored Moraines in Southern British Colum- | Geophysical, Geohydrological, and Geochemi- | PRENTISS, L. W. JR |
| bia and Alberta, Canada, W73-02042 2C | cal Reconnaissance of the Luke Salt Body, | The Corps of Engineers Chesapeake Bay Stu- |
| 117500012 | Central Arizona, W73-02480 2F | dy, |
| OSTRY, R. C. | 11 J-02450 ZF | W73-02149 2L |
| Hydrogeology of the Forty Mile Creek | PETTYJOHN, W. A. | PRICE, W. E. JR |
| Drainage Basin on the South Shore of Lake | Water Pollution by Oil-Field Brines and Re- | A Random-Walk Simulation Model of Alluvial |
| Ontario, W73-02503 2H | lated Industrial Wastes in Ohio, W73-02192 5B | Fan Deposition, |
| 1175-02505 2ft | W 13-02172 3B | W73-02342 2J |
| OTLEY, M. J. | PFADENHAUER, J. | |
| A Mass Balance Model of Trace Metals in | Comparative Ecologic Investigation on Plateau | PROTO, D. Annotated Bibliography of Lake Ontario Lim- |
| Several Delaware WatershedsA Progress Re- | Fir Forest in the Western Aargau Mountain Area (Switzerland), (In German), | nological and Related Studies. I Chemistry, |
| port, W73-02341 5B | W73-02056 (Switzerland), (In German), | W73-02443 5C |
| JB | 411 | |

Influence and Quarter W73-0

The In II. Gro W73-0

The In III. No W73-0

The In IV. Tu W73-0: SANDER The W W73-0:

SASS, J. The W. 1971. II W73-02

SATO, K The Do trolled

peratur Light Develo W73-02

SAUER, Flow F dies, W73-02
SCHAEFI Influen and Qu W73-01
SCHAEFI A Stud Potato Bean (I W73-01
SCHETZ, Density Plate, W73-02

SCHIESL Hydrole Satellite W73-02

SCHILD, Irrigationess, W73-02 SCHNEID An A Estuarii W73-02 SCHNETT Leaf To ments of Colomb W73-02

SCHOEN, Hydroc Testing W73-02

Flow UI W73-02

| PUEYO, G. | REVUTSKII, B. I. | lykh vod ot nekotorykh obusiovlivayushchikh |
|---|--|--|
| The Ambient Environment of Lichens as a | Effect of Donetsk Mineral Water on the Clini- | faktorov), |
| Function of Exterior Atmospheric Conditions | cal Course of Chronic Cholangiohepatitis, (In | W73-02332 2E |
| Existing in the Locality, W71-02290 21 | Russian), W73-02002 SC | ROSE, V. C. |
| W73-02290 2I | W15-02002 | Kinetics of Bacterial Growth During Aerobic |
| PULESTON, D. | RHEINS, B. T. | Oxidation of Organics, |
| Defending the Environment-A Case History, | Effect of Lime-Treated Water Upon Survival | W73-02449 5C |
| W73-02250 6E | of Bacteria, | ROTH, W. V. |
| managements at all | W73-02148 5F | The Need to Control Ocean Dumping, |
| PUSHKINA, N. N. The Effects on Man of Low Concentrations of | RHINEWINE, M. | W73-02526 6E |
| Uranium. | Multiple Scattering of Laser Light from Turbid | |
| W73-02429 5C | Water, | ROTH, W. V. JR |
| | W73-02181 5B | Prompt Passage of Ocean Dumping Bill is Urged. |
| PYATT, E. E. | RICHEY, E. P. | W73-02255 6E |
| A Water Quality Model for a Conjunctive Sur- | Hydro-Ecological Problems of Marinas in | W/3-02255 |
| face-Groundwater System: An Overview, W73-02178 5B | Puget Sound, | ROTHACHER, J. |
| W/3-021/6 3B | W73-02462 5C | Water Temperature in the Steamboat Drainage, |
| QUISUMBING, E. C. | | W73-02567 4C |
| The Influence of Mist Irrigation on the Potato: | RIEHL, M. L. | ROTTWEILER, K. A. |
| III. Nutrient Content of Leaves, | Effect of Lime-Treated Water Upon Survival of Bacteria. | Water Quality Measurements with Airborne |
| W73-02442 3F | W73-02148 5F | Multispectral Scanners, |
| The Influence of Mist Irrigation on the Potato | Jr | W73-02182 5A |
| IV. Tuber Quality Factors, | RIEZEBOS, H. TH. | BOUNDEDLY O 1 |
| W73-01968 3F | Some Sedimentological Aspects of the Flu- | ROUNSEFELL, G. A. Ecological Effects of Offshore Construction, |
| | vioglacial Outwash Plain Near Soesterberg | W73-02029 SC |
| RAGAN, R. M. | (The Netherlands), W73-02159 2J | W 13-02025 |
| A Nomograph Based on Kinematic Wave | W/3-02139 | ROZVAL, K. S. |
| Theory for Determining Time of Concentration | RIEZEBOS, P. A. | Studies of the Effect of Desalinated Drinking |
| for Overland Flow, W73-02322 8B | A Contribution to the Sedimentary Petrological | Water on the Functional State of the Organism, |
| W73-02322 8B | Description of the Maas Deposits in Southern | W73-02091 SF |
| RAINBOW, C. A. | Limburg (The Netherlands), | RUGH, M. C. |
| Methodology in Establishing Water Quality | W73-02153 2J | Accumulations of Certain Pesticides in Adipose |
| Standards, | RILEY, J. P. | Tissues and Performance of Angus, Hereford |
| W73-02536 5G | A Hybrid Computer Program for Predicting the | and Holstein Steers Fed Apple Processing |
| RAKHI, M. | Chemical Quality of Irrigation Return Flows, | Wastes, |
| Diffusion Resistance of Leaves in Connection | W73-02177 5B | W73-02204 5C |
| with their Anatomy (In Russian), | DINEY D. E. | RUKAVINA, N. A. |
| W73-02133 2I | RINTZ, R. E. Observations of Declining Water Lettuce Popu- | Lake Erie Nearshore Sediments-Fort Erie to |
| | lations in Lake Izabal, Guatemala, | Mohawk Point, Ontario, |
| RAMSEY, L. L. | W73-02549 2H | W73-02504 2H |
| Standing Crops of Elements and Atomic Ratios | | - Annual Company of the Company of t |
| in a Small Mammal Community, W73-02584 5A | RITCHIE, W. | RUTHERFORD, R. J. The Influence of the New England Wetland on |
| W/3-02364 3A | The Evolution of Coastal Sand Dunes, W73-02035 21 | Water Quantity and Quality, |
| RANDALL, A. | W73-02035 2J | W73-02116 2D |
| Inventory of Water Diversions and Rate Struc- | RIVERA-CORDERO, A. | Tarriconnection and the second policy |
| tures for Cities, Towns, and Villages in New | Mechanisms of Change in Activated Sludge De- | RYABCHENKO, V. A. |
| Mexico, | waterability During Aerobic Digestion, | E. Coli as an Indicator Organism for Disinfec- |
| W73-01963 6C | W73-02362 5D | tion of Water with Respect to Enteroviruses Under Various Conditions, |
| RANNEY, D. C. | ROBINSON, W. M. | W73-02085 SF |
| Water Quality Management, An Analysis of In- | An Analysis of Forested Watershed Land of | SP . |
| stitutional Patterns, | the Cape Fear River Basin Using a Computer- | SAGE, L. E. |
| W73-01978 5G | Oriented Alphanumeric Map Information As- | Zooplankton of the Sandy Bay Area, N.J., |
| RANSFORD, G. D. | sembly and Display System, | W73-02448 5C |
| Uplift Computations for Masonry Dams, | W73-02358 7C | SAMSEL, G. L. JR |
| W73-02080 8A | ROBISON, F. L. | Investigations on Nutrient Factors Limiting |
| | Low-Flow Study of Streams in Albany County, | Phytoplankton Productivity in Two Central Vir- |
| READ, V. | New York, | ginia Ponds, |
| Full Core Recovery in Unconsolidated Forma- | W73-02318 7C | W73-02452 5C |
| tions, W73-02390 8G | ROGERS, H. H. | SAMYGIN, G. A. |
| 11.5 0255 | Nutrient Removal by Waterhyacinth, | Water-Retaining Forces of the Cells of Winter |
| REED, J. R. | W73-02122 5G | Wheat Leaves and Tillering Nodes with Regard |
| Investigations on Nutrient Factors Limiting | | to Their Resistance to Slow Freezing and |
| Phytoplankton Productivity in Two Central Vir- | ROHWER, C. | Desiccation (In Russian), |
| ginia Ponds, W73-02452 5C | Effect of Well Screens on Flow Into Wells, | W73-02123 3F |
| W 13-02432 | W73-02389 8B | SANDERS, D. C. |
| REILICH, H. G. | ROMANENKO, V. A. | The Influence of a Short Period of Evaporative |
| Technical Evaluation of Phosphate-Free Home | Form of the Relation Between Melt-Water | Cooling on the Distribution of 14C in Potato |
| Laundry Detergents, | Losses and Some Hydrologic Characteristics | Plants, |
| W73-02351 5C | (O vozmozhnoy forme zavisimosti poter' ta- | W73-01969 3F |

| Influence of Mist Irrigation on Growth, Yields, and Quality of Potatoes and Snap Beans, W73-01966 3F | Saving the Dragout Keeps Plater Within Discharge Limits, W73-02227 5D | SENDLEIN, L. V. A. Recharge to Ground Water from the West |
|--|--|--|
| | AND DESCRIPTION OF THE PROPERTY OF THE PROPERT | Nishnabotna River, W73-02033 4B |
| The Influence of Mist Irrigation on the Potato: II. Growth and Development, W73-02441 3F | SCHROGHAM, G. Industrial Waste and the Small City. W73-02214 5D | SERGUNINA, L. A. |
| The Influence of Mist Irrigation on the Potato: | SCHUBEL, J. R. | Disinfection of Drinking Water Containing En- teroviruses with Electrolytic Products of Com- mon Salt. |
| III. Nutrient Content of Leaves, W73-02442 3F | Suspended Sediment Discharge of the Susquehanna River at Conowingo, Maryland, During 1969, | W73-02089 5F |
| The Influence of Mist Irrigation on the Potato IV. Tuber Quality Factors, | W73-02445 2J | SERVIZI, J. A. A Study of Sediments from Bellingham Harbor as Related to Marine Disposal, |
| W73-01968 3F | SCHULER, A. E. Oneida Shows the Way To Go, | W73-02461 5C |
| ANDERS, H. L. | W73-02196 5D | a torontage and the posterior and a second |
| The West Falmouth Oil Spill. I. Biology, | | SEXENA, S. K. |
| W73-02023 5C | SCHULTZ, M. E. Salinity-Related Polymorphism in the Brackish- | Ecology of Jalore District in Western Rajasthan. |
| ASS, J. | Water Diatom Cyclotella Cryptica. | W73-02600 4A |
| The West Falmouth Oil Spill. Data Available in | W73-02548 5C | |
| 1971. II. Chemistry, W73-02024 SC | CCHIMANN H H | SEYFRIED, C. F. |
| W13-02024 | SCHUMANN, H. H. Geophysical, Geohydrological, and Geochemi- | Economic Limit for the Amount of Reserve Capacity on Construction of Sewage Treatment |
| ATO, KANOE, | cal Reconnaissance of the Luke Salt Body. | Plants for Rapidly Growing Municipalities, |
| The Development of Rice Grains Under Con- | Central Arizona, | W73-02211 5D |
| trolled Environment: II. The Effects of Tem- perature Combined With Air-Humidity and | W73-02480 2F | CHALIFF II |
| Light Intensity During Ripening on Grain | SCHURMANN, P. | SHAMIR, U. Optimizing the Operation of Israel's Water |
| Development, | A Regulatory Mechanism for CO2 Assimilation | System, |
| W73-02001 3F | in Plant Photosynthesis: Activation of Ribu- lose-1,5-Diphosphate Carboxylase by Fructose | W73-02287 6B |
| AUER, V. B. Flow Routing Models for Stream System Stu- | 6-Phosphate and Deactivation by Fructose 1,6- | SHARPLEY, J. M. |
| dies, | Diphosphate, W73-02474 5C | Microbiological Corrosion in Water Floods, W73-02404 8G |
| W73-02176 2E | | Market Control of the |
| CHAEFER, R. | SCHWAB, G. O. | SHELEF, G. |
| Influence of Mist Irrigation on Growth, Yields, and Quality of Potatoes and Snap Beans, | Chemical and Sediment Movement from Agricultural Land into Lake Erie, W73-01957 5B | Kinetics of Algal Biomass Production Systems with Respect to Intensity and Nitrogen Concen- |
| W73-01966 3F | | tration, W73-02218 5C |
| CHAEFER, R. L. | SCHWARTZ, H. G. JR | 11 13 02210 |
| A Study of the Effects of Mist Irrigation on the Potato (Solanum tuberosum L.) and the Snap | Microbial Degradation of Pesticides in Aqueous Solutions, W73-02534 5B | SHEN, H. W. A General Stochastic Model for the Transport |
| Bean (Phaseolus vulgaris L.), W73-01967 3F | SCOTT, J. T. | of Sediment Bed Material, W73-02315 2J |
| W13-01301 3F | Transport in the Baroclinic Coastal Current | The second secon |
| CHETZ, J. A. Density Stratified, Viscous Flow Past a Flat | Near the South Shore of Lake Ontario in Early | SHERMAN, H. The Sidewall Epithermal Neutron Porosity |
| Plate, | Summer, W73-02510 2H | Log, |
| W73-02563 8B | 175-02510 | W73-02396 8G |
| CHIESL, J. W. | SCOTT, V. H. Hydraulic Properties of Perforated Well Cas- | SHESTOPEROV, G. P. |
| Hydrologic Data Collection Via Geostationary Satellite. | ings, | Methods of Relief Studies for Evaluation of the Potential Danger of Water Erosion of Soils (In |
| W73-02036 7A | W73-02395 8B | Russian). |
| | SEAGRAVES, J. A. | W73-02128 2J |
| CHILD, N. W. Irrigation Management-A Tool for Agribusi- | The Effects of Sewer Surcharges on the Level | SHETTY, K. V. P. |
| ness, | of Industrial Wastes and the Use of Water by Industry, | The Influence of Mist Irrigation on the Potato |
| W73-02546 3F | W73-02115 5G | IV. Tuber Quality Factors, W73-01968 3F |
| CHNEIDER, V. R. | Sewer Surcharges and Their Effect on Water, | |
| An Automated System for Determining Estuarine Bathymetry, | W73-02360 5G | SHILOV, M. P. Distribution of the Water Chestnut Trapa |
| W73-02317 7B | Sewer Surcharges and Their Effect on Water | natans L. s. l. in the Floodplains of Bodies of |
| CHNETTER, R. | Use, W73-02295 5G | Water in the Vladimir Oblast and Their |
| Leaf Temperature and Transpiration Measure- | | Hydrochemical Characterization, (In Russian), W73-02000 21 |
| ments of Tribulus Cistoides L. In Northern Colombia. | SEED, H. B. Evaluation of Properties of Rockfill Materials, | |
| W73-02195 2D | W73-02072 8D | SHINDALA, A. Water Quality Changes in the Distribution |
| CHOPN P | SEITZ, R. | System. |
| CHOEN, R. Hydrochemical Study of the National Reactor | The Crisis in Shoreline Recreation, | W73-02430 5F |
| Testing Station, Idaho, | W73-02302 6G | CHIPPMAN II C |
| W73-02484 5B | | SHIREMAN, H. C. Filtration Boasts Tertiary Treatment, Mixed- |
| CHRANTZ, J. | SELIDOVKIN, D. A. Studies of the Effect of Desalinated Drinking | Media Filters, Plus Filter Aids, Turn in a Top |
| Flow Ultrafiltration Benefits Equipto, | Water on the Functional State of the Organism, | Performance. |
| W73-02205 5D | W73-02091 5F | W73-02229 5D |
| | | |

STEWAI
Evaluation of Among W73-0
STICKN Interactal Terand Bo W73-0
STOBER
A Re
Proble: W73-0

STONE, Rechar Nishna W73-02 Water Waste, W73-02 STONER Reader W73-02 STUMM-Kinetic idation Waters W73-02 SUTTON The W W73-02 SVIRIDO The Ef on the Shrub ' Russian W73-02 SWANK, Water W73-02 SWEENE Annota nologica W73-02 SWEETM Sedime Reservo W73-02 SYKORA Effect Suspens velinus W73-02 SYLVEST

Method

Standar W73-025

SYNAK, N

Effect of Suspens velinus l W73-022

Relation Between the Natural Stroke Frequen-

cies of Cable-tool Systems and the Operating

Radionuclides in Transport in the Columbia River from Pasco to Vancouver, Washington, W73-02022 5B

Strokes per Minute, W73-02407

STEVENS, H. H. JR

5D

| SMIKEK, M. W. | | * | |
|--|----------|--|--|
| SHIRER, H. W. | | SMELSER, D. | SPEECE, R. E. |
| A Simple Apparatus for Measuring Act | tivity | Water Utility Distribution Loss, | Hypolimnion Aeration, |
| Patterns of Fishes. | | W73-02431 5G | W73-02137 51 |
| W73-01977 | 5A | | |
| | | SMIRNOV, A. I. | SPEIR, H. J. |
| SHLOSS, L. | | Morphological Characteristic of Aspro Zingel (L.) From the Lower Danube, (In Russian), | Fish Populations Around Edgewood Arsenal' |
| What Price Water, W73-02284 | 6B | W73-01998 2I | Chemical Agent Test Area, W73-02021 50 |
| W 13-02204 | OD | W/3-01990 | W73-02021 50 |
| SIDLE, R. C. | | SMITH, C. F. | SPENCER, W. H. |
| Evaluation of a Turfgrass-Soil System to | Util- | Secondary Depostion of Iron Compounds Fol- | Environmental Management for Puget Sound |
| ize and Purify Waste Water, | rn. | lowing Acidizing Treatments, | Certain Problems of Political Organization and |
| W73-02440 | 5B | W73-02420 8G | Alternative Approaches, |
| Groundwater Recharge and Quality Trans | sfor- | SMITH, E. J. | W73-02251 61 |
| mations During Initiation and Management | t of a | Effect of Lime Neutralized Iron Hydroxide | SPOFFORD, W. O. JR |
| New Stabilization Lagoon, | 11.0 | Suspensions on Juvenile Brook Trout (Sal- | Closing the Gap in Waste Management, |
| W73-02439 | 5B | velinus Fontinalis, Mitchill), | W73-02215 51 |
| SIDORENKO, G. L. | | W73-02277 5C | 11 10 02210 |
| Studies of the Effect of Desalinated Drin | nking | SMITH, M. H. | SPRENGLING, K. |
| Water on the Functional State of the Organ | | Standing Crops of Elements and Atomic Ratios | Cable Tool Drilling, An Investigation of th |
| W73-02091 | 5F | in a Small Mammal Community, | Relation Between the Natural Stroke Frequen |
| | | W73-02584 5A | cies of Cable-tool Systems and the Operating |
| SIEKIERSKI, S. | 2.7 | | Strokes per Minute, |
| Physical Chemistry of Extraction Processes W73-02014 | 1B | SMITH, M. J. | W73-02407 80 |
| W 73-02014 | 110 | Heavy Metal Ion Interaction and Transport | SPROUL, O. J. |
| SILVESTON, P. L. | | with Synthetic Complexing Agents and Deter- | Virucidal Effects of Chlorine in Wastewater, |
| Simulation of the Mean Performance of | Mu- | gent Phosphate Substitutes in Aquatic Systems, W73-02112 5A | W73-02538 51 |
| nicipal Waste Treatment Plants, | -62 | 117-02112 | |
| W73-02212 | 5D | SMITH, R. | SPYKER, J. W. |
| SIMMONS, H. B. | | The Economics of Automation in Wastewater | Computing Salinity Profiles in Ice, |
| The Potential of Physical Models to Invest | tigate | Treatment, | W73-02054 20 |
| Estuarine Water Quality Problems, | - | W73-02293 5D | ST. D. A. |
| W73-02455 | 5C | SMITH, R. C. | Lake Erie Nearshore Sediments-Fort Erie t |
| | | Relation of Screen Design to the Design of | Mohawk Point, Ontario, |
| SIMONS, T. J. | | Mechanically Efficient Wells, | . W73-02504 21 |
| Development of Numerical Models of I | Lake | W73-02410 8B | |
| Ontario, W73-02511 | 2H | | STANLEY, D. J. |
| W15-02511 | 244 | SMITH, T. K. | Morphology and Recent Sediments of th |
| SIMONSON, G. H. | | Rotary Drilling and Coring in Permafrost: Part | Western Alboran Basin in the Mediterranea |
| Hills Creek Reservoir Turbidity Study, | Acres | III, Deep Core Drilling, Core Analysis and Bore Hole Thermometry at Cape Thompson, | Sea, W73-02494 |
| W73-02092 | 5C | Alaska, | W 13-02494 |
| SINGLEY, J. E. | | W73-02312 8B | Sedimentary Evidence of Bottom Current Ac |
| Magnesium Carbonate: A Recycled Coagul | lant - | territorial light of the board and all the same of | tivity, Strait of Gibraltar Region, |
| 11, | | SMOLA, D. J. | W73-02496 |
| W73-02145 | 5F | Removal of Toxic Pesticides by Reverse Osmo- | |
| THE PARTY OF THE P | | sis Water Treatment, W73-02222 5D | STARSINIC, D. E. |
| SINNOTT, W. B. Oneida Shows the Way To Go, | | 11.5-02222 3D | The Census and Water Utilities, W73-02136 |
| W73-02196 | 5D | SMOOT, G. F. | W 13-02130 |
| 11 13 32170 | 30 | An Automated System for Determining | STAUFFER, T. M. |
| SJOBLOM, G. L. | | Estuarine Bathymetry, | Age, Growth, and Downstream Migration of |
| Environmental Monitoring and Disposa | | W73-02317 7B | Juvenile Rainbow Trout (Salmo gairdneri) in |
| Radioactive Wastes from U.S. Naval Nuc | | SOLIMAN, M. M. | Lake Michigan Tributary, |
| Powered Ships and Their Support Facilities | s, 5B | Boundary Flow Considerations in the Design of | W73-02574 |
| W73-01982 | эв | Wells, | STEELE, T. D. |
| SKAPTASON, P. A. | | W73-02394 8B | The Syslab System for Data Analysis of Histor |
| Control of Aquatic Vegetation in Freshwate | ter, | | ical Water-Quality Records (Basic Programs), |
| W73-02444 | 4A | SOLOMONSON, L. P. | W73-02437 7 |
| SKORA, S. | | The Nitrate Reductase of Chlorella, W73-02476 5C | |
| The German Carp (Carassius auratus gi | ibelia | # 13-024/0 SC | STENBORG, T. |
| Bloch) from the Ilownica River Stocked | | SOMERS, L. H. | Delay of Runoff from a Glacier Basin, |
| Carp Pond, | | Diving Techniques Used in the Study of Fer- | W73-02048 2 |
| W73-02026 | 81 | romanganese Nodule Deposits, | STEPHENSON, E. A. |
| | | W73-02513 2H | Cable Tool Drilling An Investigation of th |
| | | | |

SOURIRAJAN, S.

tion Control, W73-02225

W73-02575

Studies on Reverse Osmosis for Water Pollu-

SOUTHWARD, G. Evaluation of a Winter Steelhead Fishery on a Western Washington River,

Agrometeorological Conditions and Charac-

teristics of the Maize Development in the Planting-Sprouting Period, (In Bulgarian), W73-01999 3F

Seismic Profiling and Geology of the Toronto Waterfront Area of Lake Ontario, W73-02301 2H

| STEWART, J. M. | TALBOT, S. | TITTMAN, J. |
|--|--|---|
| Evaluation of Selected Aspects of Communica- | A Statistical Study of The Effects of Polyelec- | The Sidewall Epithermal Neutron Porosity |
| tion of Water Resources Research Information | trolytes, Mixing and pH Upon an Activated | Log, |
| Among University Researchers and Users, | Sludge System, | W73-02396 8G |
| W73-02357 6B | W73-02221 5D | TOPOPOWIC B |
| | TAMBOVTSEVA, A. M. | TODOROVIC, P. |
| STICKNEY, R. R. | | A General Stochastic Model for the Transport |
| Interactions of Feeding Rates and Environmen- | The Effects on Man of Low Concentrations of Uranium. | of Sediment Bed Material, |
| tal Temperature on Growth, Food Conversion, | W73-02429 5C | W73-02315 2J |
| and Body Composition of Channel Catfish, | Wis-ones 3C | TODUA, M. M. |
| W73-02572 81 | TANGHE, M. | A Method of Mathematical Modeling of Com- |
| STOBER, W. J. | Study of a Topo-Lithological Transect of the | plex Ecological Systems, |
| A Re-Examination of the Common Pool | Eprave-Rochefort Surroundings (Lomme Val- | W73-02032 5B |
| Problem, | ley, Southeast Belgium) to Delimitate the | 36 |
| W73-01956 4B | Forest Ecological Groups of the Calestienne, | TOSTESON, T. R. |
| 100 | W73-02294 4A | The Adhesive Properties of Chlorella Vulgaris, |
| STONE, R. | Anticipal particle property for the Armed States | and the Enhancement of This Adhesion by |
| Recharge to Ground Water from the West | TANNER, R. I. | Substances Found in Ambient Sea Water, |
| Nishnabotna River. | Effects of Long Chain Polymers on the Size | W73-02470 5C |
| W73-02033 4B | Distribution of Oil-In-Water Emulsions, | |
| ALTERNATION OF THE PERSON OF T | W73-02120 5G | TROCME, S. |
| Water and Sewage Sludge Absorption by Solid | TENNIPOCEN V I | The Content of Various Elements in Precipita- |
| Waste, | TENNESSEN, K. J. | tion, |
| W73-02191 5D | Aquatic Insects of the Pine-Popple River, | W73-02588 2K |
| | Wisconsin, | MINOR W. T. |
| STONER, R. F. | W73-02097 5C | TROTT, M. J. |
| Readers Comment on Step Drawdown Test, | TEREBUKHA, I. P. | Optimization of Water Resources Develop- |
| W73-02419 8G | Characteristics of Structure and Antierosive | ment: Optimization of Capacity Specifications |
| | Role of Root Systems of Woody and Shrub | for Components of Regional, Complex In- |
| STUMM-ZOLLINGER, E. | Species in Eroded Lands of the Volyn-Podolian | tegrated, Multipurpose Water Resources |
| Kinetics of Biologically Mediated Aerobic Ox- | Upland (In Russian), | Systems, |
| idation of Organic Compounds in Receiving | W73-02055 2I | W73-01970 6A |
| Waters and in Waste Treatment, | | TUR, N. M. |
| W73-02450 5C | TERENT'EVA, I. N. | New Cases of Aquatic Epiphytes, (In Spanish), |
| | Physiological Aspects of the Water Regime of | |
| SUTTON, D. L. | Plants as Related to Drought Resistance Stu- | W73-02551 2I |
| The White Amur for Aquatic Weed Control, | dies of Some Oil Crops, (In Russian), | UPDEGRAFF, D. M. |
| W73-02010 4A | W73-02013 3F | Microbiological Corrosion of Iron and Steel, |
| MIRROY I V | | W73-02403 8G |
| SVIRIDOV, I. K. | THOMAS, J. L. | 11.5 02.105 |
| The Effect of Soil and Hydrological Conditions | A Hybrid Computer Program for Predicting the | USANOVA, T. A. |
| on the Settlement and Productivity of Tree and | Chemical Quality of Irrigation Return Flows, | After Effect of Atmospheric Drought of |
| Shrub Vegetation of Don River Floodplain, (In | W73-02177 5B | Coupling of Oxidation and Phosphorylation |
| Russian), | THOMPSON, A. R. | Processes in the Leaves of Bean Plants with |
| W73-02199 4A | Kinetics of Bacterial Growth During Aerobic | Different Drought-Resistance (In Russian), |
| SWANK, G. W. | Oxidation of Organics, | W73-02134 3F |
| Water Temperature in the Steamboat Drainage, | W73-02449 5C | |
| | | VAADIA, Y. |
| W73-02567 4C | THOMPSON, C. G. | Hydraulic Properties of Perforated Well Cas- |
| SWEENEY, R. A. | Magnesium Carbonate: A Recycled Coagulant - | ings, |
| Annotated Bibliography of Lake Ontario Lim- | II, | W73-02395 8B |
| nological and Related Studies. I Chemistry, | W73-02145 5F | VAN DER EMDE, W. |
| W73-02443 5C | Wheele Co Court About 14 COS | VAN DER EMDE, W. Vienna-Blumental Sewage Treatment Plant, |
| 30 | What's So Great About MgCO3, | |
| SWEETMAN, A. P. | W73-02219 5F | W73-02197 5D |
| Sedimentation Characteristics of Gorge-Type | THOMPSON, G. P. | VAUGHN, S. H. |
| Reservoirs, | Courts and Water, The Role of the Judicial | Water for Industrial Needs: What, Where, |
| W73-02179 2J | Process. | When, |
| | W73-02365 6E | W73-02139 3E |
| SYKORA, J. L. | (dE | U.J. STATE |
| Effect of Lime Neutralized Iron Hydroxide | THOMPSON, R. W. | VEEGER, C. |
| Suspensions on Juvenile Brook Trout (Sal- | Maintenance of Water Quality-Alberta's | Relation Between Anaerobic ATP Synthesis |
| velinus Fontinalis, Mitchill), | Legislative Scheme and the Common Law, | from Pyruvate and Nitrogen Fixation in |
| W73-02277 5C | W73-02525 5G | Azotobacter vinelandii, |
| | | W73-02475 5C |
| SYLVESTER, R. O. | THORSTEINSON, A. J. | VIDENTI C D |
| Methodology in Establishing Water Quality | Metabolism of DDT by Fresh Water Diatoms, | VEITH, G. D. |
| Standards, | W73-02280 5C | Chemical Aspects of Bioassay Techniques for |
| W73-02536 5G | THAPPPU V P | Establishing Water Quality Criteria, |
| CVNAK M | TIMOFEEV, V. E. | W73-02446 5A |
| SYNAK, M. | Ecological and Geomorphological Types of | VEITH, GILMAN D. |
| Effect of Lime Neutralized Iron Hydroxide | Flood Plain and the Vegetative Structure of River Valleys of the Mid-Volga Basin (In Rus- | Chlorobiphenyls (PCBs) in the Milwaukee |
| Suspensions on Juvenile Brook Trout (Sal- velinus Fontinalis, Mitchill), | sian), | River. |
| W73-02277 5C | W73-02276 4A | W73-02084 5C |
| 11 | 11.15 | |

YANCET Recen Contin Part B W73-0

YATES, Signifi Colifor ship to Rivers W73-0

YEARY, What's W73-0

YEH, W. Optimi ment:

for Co tegrate System W73-01

YOCUM, A Sur Popula Rivers, W73-02

YOUNG, Rodma W73-02

YOUNG, An Ed Pennsy Oxyget W73-07 YOUNGH Hills C W73-07 ZEGERS Content from th W73-07

ZHAMAI Soil Ai rigated bakhta W73-02

ZHOLDA Charac 'Bloom W73-02

Eco-Ph Influen minatic and the the Eff W73-02

ZIEGLEI

Accum Tissues and H Wastes W73-02

ZONDER Determ in Hum sis, W73-02

| VENABLE, R. L. | WETZEL, M. C. Control of Nitrate Contamination of Ground | WILLIAMS, K. Optimum Conjunctive Use of a Dual-Purpose |
|---|--|--|
| The Effects of Divalent Metal Ions on the Micellar Properties of Sodium Dodecyl Sulfate, W73-02557 2K | Water Associated with Land Disposal of Mu- nicipal Sewage, | Desalting Plant and Multi-Purpose Surface Water Reservoirs. |
| | W73-02111 5B | W73-02083 3A |
| VENNESLAND, B. | WHALEY, M. L. | WILLSON, H. R. |
| The Nitrate Reductase of Chlorella, W73-02476 5C | Hydraulic Parameters Controlling Bedform | Effects of an Organophosphorus Insecticide on |
| VISHNEVSKIY, P. F. | Migration on an Intertidal Sand Body, W73-02489 2L | the Phytoplankton, Zooplankton, and Insect Populations of Fresh-Water Ponds, |
| Storm Runoff Coefficients for Rivers of the | W/3-02469 | W73-02453 5C |
| Ukraine and Moldavia (Koeffitsiyenty stoka | WHEATLAND, A. B. | WILSON, L. G. |
| dozhdevykh pavodkov na rekakh Ukrainy i Moldavii), | Prevention of Pollution From the Industrial Use of Oil. | Groundwater Recharge and Quality Transfor- |
| W73-02333 4A | W73-02434 5D | mations During Initiation of a New Sewage Sta- bilization Pond (and Management), |
| VON DER EMDE, W. | WHINSTON, A. B. | W73-02438 5B |
| Design Considerations for Large Treatment Plants. | Economic Analyses of Optimal Water Quality | WILSON, L. L. |
| W73-02213 5D | Management, W73-01951 5G | Accumulations of Certain Pesticides in Adipose |
| WACKED W. C | | Tissues and Performance of Angus, Hereford |
| WAGNER, W. C. Utilization of Alewives by Inshore Piscivorous | WHITE, O. L. New Evidence for Spencer's Laurentian River, | and Holstein Steers Fed Apple Processing Wastes, |
| Fishes in Lake Michigan, | W73-02505 2H | W73-02204 5C |
| W73-02578 2H | The plant of the state of the s | WINDOW |
| WALLER, W. T. | WIENER, A. The Development of Israel's Water Resources, | WIND, K. Contribution to the Ecology of Cirsium Pa- |
| A Simple Apparatus for Measuring Activity | W73-02292 6B | lustre (L.) Scop, |
| Patterns of Fishes, | A T DOMESTI | W73-02279 2I |
| W73-01977 5A | WIERZBICKI, K. The Effect of Ecological Conditions on the | WINFREY, H. J. |
| WALSH, J. B. | Parasite Fauna of Perch Perca Fluviatilis L. In | Investigations on Nutrient Factors Limiting |
| A Fracture Criterion for Brittle Anisotropic Rock. | Lake Dargin, | Phytoplankton Productivity in Two Central Vir- |
| W73-02397 8E | W73-02500 5C | ginia Ponds, W73-02452 SC |
| WALTON, C. P. | WIGGERS, A. J. | - Other than the second |
| Aquatic Insects of the Pine-Popple River, | The Effects of Selective Erosion by Overland | WITZ, S. Development of a Tape Transport Bacterial De- |
| Wisconsin, | Flow on the Ice-Pushed Ridges of Uelsen (County Bentheim, Germany), | tection System; Final Report, |
| W73-02097 5C | W73-02157 2J | W73-02012 5A |
| WALTON, W. C. | WILD, M. | WOLFE, R. |
| Yields of Deep Sandstone Wells in orthern Il- | Maintenance of Water Quality-Alberta's | Regional Government in New England: A |
| linois, W73-02386 3B | Legislative Scheme and the Common Law, | Prototype, |
| | W73-02525 5G | W73-02304 6G |
| Yields of Shallow Dolomite Wells in Northern Illinois. | WILDE, P. | WRABER, M. |
| W73-02399 4B | Recent Sediments of the Central California | Chorology, Ecology and Sociology of Chima- phila Umbellata (L.) Bart. In Slovenia (Yu- |
| WANG, MU-HAO-SUNG | Continental Shelf-Pillar Point to Pigeon Point: Part B. Mineralogical Data, | goslaviaia), |
| Separation of Lignin from Aqueous Solution by | W73-02319 2J | W73-02272 2I |
| Adsorptive Bubble Separation Processes, | WILFERT, G. L. | WUENSCHE, U. |
| W73-02350 5D | Effects of Institutional Constraints and | Effect of Foliar Spray and Soil Application of |
| WARD, J. C. | Resources Planning on Growth in and Near | CCC on Transpiration and Dry Matter Produc- |
| Concentration of Brines by Spray Evaporation, | Estuaries, W73-02465 5C | tion of Spring Wheat, W73-02499 2D |
| W73-02081 5E | The state of the s | CHECKER S. S. S. CHITCHE |
| WATANABE, A. | WILLIAMS, C. E. JR | WYLLIE, M. R. J. |
| Algal Nitrogen Fixation in the Tropics, W73-02473 5C | Carrying Capacity of Drilling Muds, W73-02379 8B | Log Interpretations in Sandstone Reservoirs, W73-02423 |
| W13-02413 | No. of the last of | |
| WATKINS, J. L. | WILLIAMS, D. Microwave Emission Characteristics of Oil | YABLONSKIY, V. V. Investigation of the Rates and Traveltime of |
| Accumulations of Certain Pesticides in Adipose Tissues and Performance of Angus, Hereford | Slicks. | Storm Runoff in the Carpathians (K voprosu ob |
| and Holstein Steers Fed Apple Processing | W73-02162 5A | issledovanii skorostey i vremeni dobeganiya |
| Wastes, W73-02204 5C | WILLIAMS, H. O. | livnevykh vod v Karpatakh), W73-02334 4A |
| | Maintaining Water Well Yield, | A STATE OF THE STA |
| WEICKMANN, H. K. | W73-02369 8G | YAMAGISHI, H. Note on the Swimming Behavior of |
| Design, Execution, and Results of a Mesoscale Snowstorm Modification Project, | Water Well Hydraulics, | Chironomus Plumosus Larvae in Lake Suwa, |
| W73-02483 2C | W73-02370 8B | (In Japanese), |
| WEISER, H. H. | WILLIAMS, J. | W73-02586 2H |
| Effect of Lime-Treated Water Upon Survival | Physical-Chemical Crisis IndicatorsAre There | YAMAMOTA, Y. |
| of Bacteria, | Any, | Algal Nitrogen Fixation in the Tropics, |
| W73-02148 5F | W73-02150 5A | W73-02473 5C |

The Molluscicide Action of Thiol Reagents (Die Molluscizide Wirkung Von Thiol-Reagentien),

ZSOLNAL, T.

| YANCEY, T. | |
|--|----------|
| Recent Sediments of the Central Californi Continental Shelf-Pillar Point to Pigeon Point | a t: |
| Part B. Mineralogical Data, W73-02319 | J |
| YATES, V. J. | |
| Significance of the Fecal Streptococc Coliform Bacteria and Coliphage in Relation ship to Enteric Virus Pollution in Sewage an Rivers, | d |
| W73-02119 51 | В |
| YEARY, C. What's So Great About MgCO3, W73-02219 5 | F |
| YEH, W. W-G. | |
| Optimization of Water Resources Development: Optimization of Capacity Specification for Components of Regional, Complex Is tegrated, Multipurpose Water Resource Systems, | 15 |
| W73-01970 6. | A |
| YOCUM, T. W. | |
| A Survey of the Benthic Macroinvertebrat Populations in the New Hope and Lower Har Rivers, | ie w |
| | B |
| YOUNG, C. W. B. | |
| Rodman Drawdown Saves Trees, W73-02258 | E |
| YOUNG, D. L. | |
| An Estimate of Primary Productivity in Pennsylvania Trout Stream Using a Diurn | a al |
| Oxygen Curve Technique, W73-02030 5. | A |
| YOUNGBERG, C. T. | |
| Hills Creek Reservoir Turbidity Study, | |
| | C |
| ZEGERS, C. | |
| Contents and Behaviour of Mercury as Conpared with Other Heavy Metals in Sedimen from the Rivers Rhine and Ems, | n- ts |
| | В |
| ZHAMANKULOV, A. | |
| Soil Amelioration Conditions in the Akdala I rigated Massif (On the Example of the Bak bakhta Rice Growing Sovkhoz) (In Russian), | |
| | F |
| ZHOLDAKOVA, Z. I. | |
| Characterization of Phenols in Areas of Wat 'Blooming' in Open Bodies of Water, | |
| | C |
| ZIEGLER, H. Eco-Physiocloical Studies on Desert Plants: \(\) Influence of Soaking and Redrying on the Gemination of Zygophyllum Coccineum See and the Possible Contribution of an Inhibitor | r- ds |
| the Effect, | 21 |
| W 13-04073 | 48 |

ZIEGLER, J. H.

W73-02204 ZONDERHUIS, J.

W73-02018

Determination of Manganese, Copper, and Iron in Human Blood by Neutron Activation Analy-

Accumulations of Certain Pesticides in Adipose Tissues and Performance of Angus, Hereford and Holstein Steers Fed Apple Processing

GEOGR The E W73-0

THE PURE STATE OF THE

PAVLIN STATIO The I tions of W73-0

ACADE
TOLBUI
AND SU
Biolog
Foreig
garian
W73-0

AEROJI CALIF. Micro Slicks W73-0

Devel tectio W73-4 AGRIC

Control lustre W73-4
AGRICI

(NETHE Relati from Azoto W73-0

FACUL Boun Wells W73-

E. Co tion of Under W73-0

mon S W73-0

Diffu with t W73-4 AKADE VILNIU

> Biolo the P Groun and T Shoot W73-

ORGANIZATIONAL INDEX

| | And the second stands they | |
|---|--|---|
| ABERDEEN UNIV. (SCOTLAND). DEPT. OF | AKADEMIYA NAUK SSSR, MOSCOW. INST. | AMERICAN MANAGEMENT ASSOCIATION, |
| GEOGRAPHY. The Evolution of Coastal Sand Dunes, | OF PLANT PHYSIOLOGY. Water-Retaining Forces of the Cells of Winter | NEW YORK. |
| W73-02035 21 | Wheat Leaves and Tillering Nodes with Regard | Toward Effective and Equitable Pollution Con- |
| W 13-02033 | | trol Regulation, W73-02520 5G |
| ACADEMY OF AGRICULTURAL SCIENCES, | to Their Resistance to Slow Freezing and Desiccation (In Russian), | W 15-02520 3G |
| PAVLIKENI (BULGARIA). EXPERIMENT | W73-02123 3F | AMERICAN WATER WORKS ASSOCIATION, |
| STATION OF IRRIGATED AGRICULTURE. | and the second of the second o | NEW YORK. |
| The Influence of Post-Irrigation Soil Cultiva- | After Effect of Atmospheric Drought of | On the Recreational Use of Domestic Water |
| tions on the Sugar Beet Yield, (In Bulgarian), W73-02003 | Coupling of Oxidation and Phosphorylation | Supply Reservoirs. |
| W73-02003 3F | Processes in the Leaves of Bean Plants with | W73-02132 5G |
| ACADEMY OF AGRICULTURAL SCIENCES, | Different Drought-Resistance (In Russian), | On the Hea of Basismed Westernston on a |
| TOLBUKHIN (BULGARIA). INST. OF WHEAT | W73-02134 3F | On the Use of Reclaimed Wastewaters as a |
| AND SUNFLOWERS. | AKADEMIYA NAUK SSSR, MOSCOW. | Public Water-Supply Source. W73-02141 3C |
| Biological and Economic Properties of Certain | INSTITUT OKEANOLOGII. | 117502141 |
| Foreign Irrigated Soft Wheat Varieties, (In Bul- | Radiometric Evidence for Recent Formation of | AMERICAN WATER WORKS ASSOCIATION, |
| garian), | Phosphatic Nodules in Marine Shelf Sediments, | NEW YORK. COMMITTEE ON AVAILABILITY |
| W73-02004 3F | W73-02497 2J | AND DEVELOPMENT OF WATER SUPPLY. |
| AEROJET-GENERAL CORP., EL MONTE, | | Research Needed on Availability and Develop- |
| CALIF. MICROWAVE DIV. | AKADEMIYA NAUK SSSR, VLADIVOSTOK. | ment of Water Supply. |
| Microwave Emission Characteristics of Oil | INSTITUT MORSKOGO BIOLOGII. | W73-02126 6B |
| Slicks, | Quantitative Description of the Initial Links of | AMERICAN WATER WORKS ASSOCIATION, |
| W73-02162 5A | the Production Process in the Shallow-Water | NEW YORK, COMMITTEE ON POLLUTION |
| | Bays of the Posiet Bau (Japanses Sea), (In Russian), | PARAMETERS. |
| AEROJET MEDICAL AND BIOLOGICAL | W73-02597 5C | Community Water Pollution R and D Needs. |
| SYSTEMS, EL MONTE, CALIF. Development of a Tape Transport Bacterial De- | | W73-02144 5G |
| tection System; Final Report, | AKADEMIYA NAUK URSR, KIEV. INSTYTUT | |
| W73-02012 5A | ZOOLOGII. | AMERICAN WATER WORKS ASSOCIATION, |
| *************************************** | Morphological Characteristic of Aspro Zingel | NEW YORK. QUALITY CONTROL IN |
| AGRICULTURAL UNIV., WAGENINGEN | (L.) From the Lower Danube, (In Russian), | RESERVOIRS COMMITTEE. |
| (NETHERLANDS). | W73-01998 2I | Artificial Destratification in Reservoirs. |
| Contribution to the Ecology of Cirsium Pa- | AKADEMIYA NAUK UZBEKSKOI SSR, | W73-02138 5G |
| lustre (L.) Scop, | TASHKENT, INSTITUT SEISMOLOGII. | AMSTERDAM UNIV. (NETHERLANDS), LAB. |
| W73-02279 21 | Subsurface Water as a Major Factor in the For- | FOR PHYSICAL GEOGRAPHY AND SOIL |
| AGRICULTURAL UNIV., WAGENINGEN | mation of Landslides on the Left Bank of the | SCIENCE. |
| (NETHERLANDS). DEPT. OF BIOCHEMISTRY. | Chirchik River (Podzemnyye vody-osnovnoy | A Contribution to the Sedimentary Petrological |
| Relation Between Anaerobic ATP Synthesis | faktor formirovaniya opolzney levoberezh'ya | Description of the Maas Deposits in Southern |
| from Pyruvate and Nitrogen Fixation in | Chirchika), | Limburg (The Netherlands), |
| Azotobacter vinelandii, | W73-02066 2J | W73-02153 2J |
| W73-02475 5C | ALABAMA MARINE RESOURCES LAB., | AMSTERDAM UNIV. (NETHERLANDS). LAB. |
| AIN SHAMS UNIV., CAIRO (EGYPT). | DAUPHIN ISLAND. | OF PHYSICAL GEOGRAPHY AND SOIL |
| FACULTY OF ENGINEERING. | Description of Alabama Estuarine Areas- | SCIENCE. |
| Boundary Flow Considerations in the Design of | Cooperative Gulf of Mexico Estuarine Invento- | The Effects of Selective Erosion by Overland |
| Wells, | ry, | Flow on the Ice-Pushed Ridges of Uelsen |
| W73-02394 8B | W73-02037 2L | (County Bentheim, Germany), |
| | | W73-02157 2J |
| AKADEMIYA MEDITSINSKIKH NAUK SSSR. | ALASKA UNIV., COLLEGE. INST. OF WATER | ANACAPA SCIENCES, INC., SANTA |
| E. Coli as an Indicator Organism for Disinfec- | RESOURCES. | BARBARA, CALIF. |
| tion of Water with Respect to Enteroviruses | Note on the Finite Element Solution of the Dif- | Assessment of Turbidity, Color, and Odor in |
| Under Various Conditions, W73-02085 5F | fusion-Convection Equation, W73-02338 2E | Water, |
| W 73-02083 | W /3-02336 ZE | W73-01971 5G |
| Disinfection of Drinking Water Containing En- | ALL-UNION DESIGNING, SURVEYING AND | |
| teroviruses with Electrolytic Products of Com- | SCIENTIFIC RESEARCH INST. | ARIXONA UNIV., TUCSON. DEPT. OF SOILS, |
| mon Salt, | HYDROPROJECT, MOSCOW (USSR). | WATER AND ENGINEERING. |
| W73-02089 5F | Geology and Dams. Volume IV. | Evaluation of a Turfgrass-Soil System to Util- |
| AKADEMIYA NAUK ESTONSKOI SSR, TARTU. | W73-02067 8A | ize and Purify Waste Water, W73-02440 SB |
| INSTITUT FIZIKI I ASTRONOMII. | ALL-UNION SCIENTIFIC RESEARCH INST. OF | W73-02440 5B |
| Diffusion Resistance of Leaves in Connection | HYDROGEOLOGY AND ENGINEERING | ARIZONA UNIV., TUCSON. DEPT. OF |
| with their Anatomy (In Russian), | GEOLOGY, MOSCOW (USSR). | ANTHROPOLOGY. |
| W73-02133 2I | A Dictionary of Hydrogeology and Engineering | Thermal, Turbidity, and pH Conditions of the |
| | Geology (Slovar' po gidrogeologii i inzhenernoy | Upper White River: Sioux and Dawes Coun- |
| AKADEMIYA NAUK LITOVSKOI SSR, | geologii), | ties, Nebraska, |
| VILNIUS. INST. OF BOTANY. | W73-02064 IOA | W73-02151 SC |
| Biological Characteristics of Cranberries and | Walland Francis of the State of | ABITONA IINIU TIICOON BERT OF |
| the Problem of Their Cultivation. 1. Effect of | Radioisotope Investigation Techniques in En- | ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES. |
| Ground Water Level, Sand Layer Thickness | gineering Geology and Hydrogeology | A Random-Walk Simulation Model of Alluvial |
| and Type of Peat on Rootage of Cuttings and Shoot Growth, (In Lithuanian), | (Radioizotopnyye metody issledovaniya v inz- henernoy geologii i gidrogeologii), | Fan Deposition, |
| W73-02025 3F | W73-02328 8G | W73-02342 2J |

| ARIZONA UNIV., TUCSON. DEPT. OF SOILS, | ARMY ENGINEER DISTRICT, HUNTINGTON, | ARMY ENGINEER DISTRICT, SAVANNAH, |
|--|---|--|
| WATER AND ENGINEERING. | W. VA. Alum Creek Lake, Alum Creek, Scioto River | GA. Curry Creek Reservoir, North Oconee River, |
| Groundwater Recharge and Quality Transfor- | Basin, Ohio (Draft Environmental Impact | Georgia (Draft Environmental Impact State- |
| mations During Initiation and Management of a New Stabilization Lagoon, | Statement). | ment). |
| W73-02439 5B | W73-01986 8A | W73-02523 |
| ARIZONA UNIV., TUCSON. LAB. OF | Whiteoak Dam and Reservoir, Whiteoak Creek | ARMY ENGINEER DISTRICT, WALLA |
| TREE-RING RESEARCH. | Basin, Ohio (Draft Environmental Impact | WALLA, WASH. Ririe Dam and Lake, Willow Creek, Idaho |
| Recent Climatic Change and Development of | Statement). W73-01990 8A | (Draft Environmental Impact Statement). |
| the Bristlecone Pine (P. Longaeva Bailey) | Wiscons | W73-01988 8D |
| Krummholz Zone, Mt. Washington, Nevada, | Local Protection and Floodproofing Project, | A DAME THE OWNER DESCRIPTION AND ADDRESS OF THE OWNER. |
| W73-02169 4A | Matewan, West Virginia, Tug Fork of Big | ARMY ENGINEER DISTRICT, WILMINGTON, N.C. |
| ARIZONA WATER RESOURCES RESEARCH | Sandy River (Draft Environmental Impact Statement). | Military Ocean Terminal, Sunny Point, North |
| CENTER, TUCSON. | W73-01991 8A | Carolina (Draft Environmental Impact State- |
| Groundwater Recharge and Quality Transfor- | | ment). |
| mations During Initiation of a New Sewage Sta- | ARMY ENGINEER DISTRICT, | W73-01981 4A |
| bilization Pond (and Management), | JACKSONVILLE, FLA. Miami Harbor, Florida, Navigation (Final En- | ARMY ENGINEER WATERWAYS |
| W73-02438 5B | vironmental Impact Statement). | EXPERIMENT STATION, VICKSBURG, MISS. |
| ARMY CORPS OF ENGINEERS, WALTHAM, | W73-02517 8A | The Potential of Physical Models to Investigate |
| MASS. NEW ENGLAND DIV. | | Estuarine Water Quality Problems, |
| Bucks Harbor, Machiasport, Maine (Final En- | ARMY ENGINEER DISTRICT, LOS ANGELES, | W73-02455 5C |
| vironmental Impact Statement). | CALIF. Port Hueneme Harbor, Ventura County, | Meltwater Gaging Program Project No 1, Ap- |
| W73-02234 8A | California (Draft Environmental Impact State- | proach Roads, Tuto Area, Greenland. |
| | ment). | W73-02486 2C |
| ARMY ENGINEER DISTRICT, ANCHORAGE, | W73-01984 8A | AUBURN UNIV., ALA. DEPT. OF BOTANY AND |
| ALASKA. | Latin and Warm County Con Barrandina Coun | MICROBIOLOGY. |
| Small Boat Harbor Project, Bethel, Alaska (Final Environmental Impact Statement). | Lytle and Warm Creeks, San Bernardino Coun- ty, California (Final Environmental Impact | Nutrient Removal by Waterhyacinth, |
| W73-02264 4A | Statement). | W73-02122 5G |
| NATURE DE LA COLOR | W73-01987 8A | AUSTRALIAN NATIONAL UNIV., CANBERRA. |
| ARMY ENGINEER DISTRICT, BALTIMORE, | Namball Common and Minister I as Assolute | Fundamentals of Rock Mechanics, |
| MD. | Newhall, Saugus and Vicinity, Los Angeles County, Santa Clara River and Tributaries, | W73-02372 8E |
| The Corps of Engineers Chesapeake Bay Stu- | California (Draft Environmental Impact State- | |
| dy, | ment). | BAGHDAD UNIV. (IRAQ), COLL. OF ENGINEERING. |
| W73-02149 2L | W73-02521 8A | Hydraulics of Wells, |
| Saint Catherine Sound, Maryland (Maintenance | ARMY ENGINEER DISTRICT, LOUISVILLE, | W73-02378 8B |
| Dredging) (Final Environmental Impact State- | KY. | |
| ment). | Highland Lake Fall Creek Basin, Indiana (Draft | BAILEY METERS AND CONTROLS LTD., LONDON (ENGLAND). |
| W73-02516 4A | Environmental Impact Statement). | Petroleum Tanker Pollution Monitoring Unit, |
| ARMY ENGINEER DISTRICT, BUFFALO, N.Y. | W73-02253 8D | W73-02194 5A |
| Hamlin Beach State Park Cooperative Beach | Camp Ground Lake, Salt River Basin, Ken- | |
| Erosion Control Project, Lake Ontario, Mon- | tucky (Draft Environmental Impact Statement). | BANARAS HINDU UNIV., VARANASI, (INDIA). DEPT. OF GEOGRAPHY. |
| roe County, New York (Draft Environmental | W73-02269 8A | Water Table Fluctuations in the Meerut Dis- |
| Impact Statement). | ARMY ENGINEER DISTRICT, MOBILE, ALA. | trict, Uttar Pradesh, India, |
| W73-02261 8A | Dredging and Filling, Cowikeee State Park, | W73-02044 4B |
| Ni Control Mater Zee West and Assistation | Lakepoint Resort, Walter F. George Lake, | BATTELLE MEMORIAL INST., COLUMBUS, |
| Big Creek and Metro Zoo Flood and Aesthetic | Chattahoochee River, Alabama (Draft Environ- | OHIO. |
| Improvement, Cleveland, Ohio (Draft Environ- mental Impact Statement). | mental Statement). | Water Quality Criteria Data Book - Volume 3: |
| W73-02268 4A | W73-02233 4A | Effects of Chemicals on Aquatic Life, Selected |
| | Pearl River Basin, Edinburg Dam and Lake, | Data from the Literature Through 1968. W73-01976 5C |
| ARMY ENGINEER DISTRICT, CHARLESTON, | Mississippi and Louisiana (Draft Environmen- | W73-01976 5C |
| S.C. | tal Impact Statement). | BATTELLE MEMORIAL INST., RICHLAND, |
| Clinchfield Dam and Reservoir, Broad River | W73-02254 8D | WASH. PACIFIC NORTHWEST LABS. |
| Basin, North Carolina and South Carolina (Draft Environmental Impact Statement). | ARMY ENGINEER DISTRICT, NEW YORK. | Effects of Institutional Constraints and |
| W73-02524 8D | Hempstead Harbor, New York Navigation Pro- | Resources Planning on Growth in and Near Estuaries, |
| | ject (Draft Environmental Impact Statement). | W73-02465 5C |
| ARMY ENGINEER DISTRICT, DETROIT, | W73-01995 8A | III OUTE A LIGHT THEORY |
| MICH. | ARMY ENGINEER DISTRICT, PORTLAND, | BELANTE, CLAUSS, MILLER AND NOLAN, |
| River Rouge Flood Control Project, Wayne | OREG. | INC., SCRANTON, PA. 15 Towns Join Hands, |
| County, Michigan (Final Environmental Impact Statement). | Lost Creek Lake Project, Rogue River, Oregon | W73-02223 5D |
| W73-02270 4A | (Final Environmental Impact Statement). | |
| X 11 (20.47W) | W73-01989 8D | BELL TELEPHONE LABS., INC., WHIPPANY, |
| ARMY ENGINEER DISTRICT, GALVESTON, | ARMY ENGINEER DISTRICT, SACRAMENTO, | N.J. Multiple Scattering of Laser Light from Turbid |
| TEX. | CALIF. | Water, |
| Taylors Bayou, Texas, Drainage and Flood | Sacramento River Bank Protection Project, | W73-02181 5B |
| Control Project (Final Environmental Impact Statement). | California (Draft Environmental Impact State- ment). | BELORUSSKII |
| W73-02230 8A | W73-02266 8D | NAUCHNO-ISSLEDOVATELSKII INSTITUT |
| | | |

METERSON SERVICE SERVI

| MELIORATSH I VODNOGO KHOZYAISTVA, MINSK (USSR). | BUREAU OF RECLAMATION, DENVER, | lose-1,5-Diphosphate Carboxylase by Fructose |
|--|--|---|
| Problems in the Utilization and Conservation of | COLO. | 6-Phosphate and Deactivation by Fructose 1,6- |
| Water Resources (Problemy ispol'zovaniya i | Hydraulic Model Studies of Scoggins Dam Fish Trap Aerator and Supply Structure, | Diphosphate, W73-02474 SC |
| okhrany vodnykh resursov). | W73-02069 8I | W13-001-14 |
| W73-02061 4A | D. 100 | CALIFORNIA UNIV., BERKELEY, DEPT, OF |
| BENDIX AEROSPACE SYSTEMS DIV., ANN | Drilling and Grouting Experiences in Un- derground Construction. | ENTOMOLOGY AND PARASITOLOGY. |
| ARBOR, MICH. | W73-02070 8A | Effects of an Organophosphorus Insecticide on |
| Water Quality Measurements with Airborne | | the Phytoplankton, Zooplankton, and Insect Populations of Fresh-Water Ponds. |
| Multispectral Scanners, | Water wells and Ground Water Contamination, W73-02413 | W73-02453 5C |
| W73-02182 5A | | |
| BIRD WELL SURVEYS, BRADFORD, PA. | BUREAU OF RECLAMATION, DENVER, | CALIFORNIA UNIV., BERKELEY. HYDRAULIC ENGINEERING LAB. |
| Interpretation of Temperature Logs in Water- | COLO. WATER OPERATIONS BRANCH. | Recent Sediments of the Central California |
| and Gas-Injection Wells and Gas-Producing Wells, | Irrigation ManagementA Tool for Agribusi- ness, | Continental Shelf-Pillar Point to Pigeon Point: |
| W73-02405 8G | W73-02546 3F | Part B. Mineralogical Data, |
| THE RESERVE OF THE PARTY OF THE | | W73-02319 2J |
| BOSTON UNIV., MASS. SCHOOL OF LAW. | BUREAU OF RECLAMATION, WASHINGTON, D.C. | CALIFORNIA UNIV., DAVIS. |
| Regional Government in New England: A Prototype, | Tehama-Colusa, Central Valley Project, | Hydraulic Properties of Perforated Well Cas- |
| W73-02304 6G | California (Final Environmental Impact State- | ings, |
| | ment). | W73-02395 8B |
| BRITISH COLUMBIA UNIV., VANCOUVER. | W73-01994 8A | |
| INST. OF ANIMAL RESOURCES AND ECOLOGY. | The Undersea Aqueduct-A New Concept in | CALIFORNIA UNIV., IRVINE. |
| Simulation Studies of the Adams River | Transportation, | Studies on Algal Growth, Development, and |
| Sockeye Salmon (Oncorhynchus nerka), | W73-02076 8A | Reproduction, W73-02099 5C |
| W73-02580 8I | Buchle Dam and Beremain Emission Ashan | # 13-02033 |
| BROWN AND CALDWELL ALMANDA | Pueblo Dam and Reservoir, Fryingpan-Arkan- sas Project Colorado (Final Environmental Im- | CALIFORNIA UNIV., LOS ANGELES. SCHOOL |
| BROWN AND CALDWELL, ALHAMBRA, CALIF. | pact Statement). | OF ENGINEERING AND APPLIED SCIENCE. |
| Rate Design and Cost of Service, | W73-02265 8D | Optimization of Water Resources Develop- |
| W73-02298 6C | | ment: Optimization of Capacity Specifications |
| | BUREAU OF THE CENSUS, WASHINGTON, | for Components of Regional, Complex In- |
| BROWN UNIV., PROVIDENCE, R.L. DIV. OF | D.C. POPULATION DIV. The Census and Water Utilities, | tegrated, Multipurpose Water Resources |
| ENGINEERING. Effects of Long Chain Polymers on the Size | W73-02136 6D | Systems, W73-01970 6A |
| Distribution of Oil-In-Water Emulsions, | | #13-01310 |
| W73-02120 5G | CALIFORNIA STATE DEPT. OF FISH AND | CAMP, DRESSER AND MCKEE, BOSTON, |
| 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | GAME, SACRAMENTO. A Polypropylene Light Trap for Aquatic Inver- | MASS. |
| BRUSSELS UNIV. (BELGIUM). LABORATOIRE DE BOTANIQUE SYSTEMATIQUE ET | tebrates. | Influence of Stream Quality Standards on Pota- |
| D'ECOLOGIE. | W73-02458 7B | ble Quality, Need for Standards, W73-02130 5G |
| Study of a Topo-Lithological Transect of the | | W /3-02130 |
| Eprave-Rochefort Surroundings (Lomme Val- | Some Effects of Logging and Associated Road Construction on Northern California Streams, | CANADA DEPT. OF ENERGY, MINES AND |
| ley, Southeast Belgium) to Delimitate the | W73-02573 4C | RESOURCES, BURLINGTON, ONTARIO, |
| Forest Ecological Groups of the Calestienne, W73-02294 | | INLAND WATERS BRANCH. DEPARTMENT |
| W /3-02294 | CALIFORNIA STATE DEPT. OF PUBLIC | OF ENERGY, MINES AND RESOURCES, |
| BUCHAREST UNIV. (RUMANIA). | HEALTH, SACRAMENTO. Experiences with Wastewater Disinfection in | BURLINGTON (ONTARIO). CANADA CENTRE |
| Records About Ecology of Some Characeae | California. | FOR INLAND WATERS. An Investigation of Horizontal Diffusion in |
| Species from the Floodplain of the Danube, (In | W73-02539 5D | Lake Ontario, |
| Rumanian), W73-02249 2I | | W73-02507 2H |
| W 13-02249 | CALIFORNIA STATE DEPT. OF WATER | |
| BUCK, SEIFEIT AND JOST, MORRISVILLE, | RESOURCES, SACRAMENTO. Water for the West, | CASE WESTERN RESERVE UNIV., |
| PA. | W73-02129 6D | CLEVELAND, OHIO. |
| What's it all About. Algae, W73-02187 5G | THE RESIDENCE OF THE PARTY OF T | Effects of Temperature on Osmotic and Ionic |
| W/3-0216/ | Water Economics, W73-02543 4B | Regulation in Goldfish, W73-02103 5C |
| BUCKMAN LABS., INC., MEMPHIS, TENN. | W 73-02343 4B | W 73-02103 |
| PETROLEUM SECTION. | CALIFORNIA UNIV., BERKELEY. | CASE WESTERN RESERVE UNIV., |
| Microbiological Corrosion in Water Floods, W73-02404 8G | Phenol Sorption by Activated Carbon and | CLEVELAND, OHIO. DIV. OF FLUID, |
| W73-02404 8G | Selected Macroporous Resins, W73-02206 5D | THERMAL AND AEROSPACE SCIENCES. |
| BUCKNELL UNIV., LEWISBURG, PA. DEPT. | W 73-02206 3D | The Coastal Boundary Layers of a Lake, W73-02508 2H |
| OF BIOLOGY. | Kinetics of Algal Biomass Production Systems | W 73-02306 |
| An Estimate of Primary Productivity in a | with Respect to Intensity and Nitrogen Concen- | CENTRAL ARID ZONE RESEARCH INST., |
| Pennsylvania Trout Stream Using a Diurnal Oxygen Curve Technique, | tration, W73-02218 5C | JODHPUR (INDIA). |
| W73-02030 5A | | Ecology of Jalore District in Western |
| | The Analytical Control of Anti-Corrosion | Rajasthan, W73-02600 4A |
| BUNDESFORSCHUNGSANSTALT FUER | Water Treatment, | W73-02600 4A |
| FISCHEREI, HAMBURG (WEST GERMANY). Toxicological Studies on Emulsions for the | W73-02411 5F | CENTRE NATIONAL DE RECHERCHES |
| Combatting of Oil Pollution (Toxikologische | CALIFORNIA UNIV., BERKELEY, DEPT. OF | AGRONOMIQUES DE BAMBEY (SENEGAL). |
| Untersuchung Von Emulgatoren Fuer Die | CELL PHYSIOLOGY. | Contribution to the Study of Nitrogen Leaching |
| Bekaempfung Von Oelverschmutzungen), | A Regulatory Mechanism for CO2 Assimilation | in a Sandy Soil ('Dior') in Senegal, |
| | | |

| CHEROKEE NATIONAL FOREST, | CONNECTICUT UNIVERSITY, STORRS. | DEPARTMENT OF ENERGY, MINES AND |
|---|--|--|
| CLEVELAND, TENN. | BIOLOGICAL SCIENCES GROUP. Salinity-Related Polymorphism in the Brackish- | RESOURCES, BURLINGTON (ONTARIO). CANADA CENTRE FOR INLAND WATERS. |
| Unit Plan for Management of the Hiwassee Unit, Cherokee National Forest, Tennessee | Water Diatom Cyclotella Cryptica, | Lake Eric Nearshore Sediments-Fort Eric to |
| (Draft Environmental Impact Statement). | W73-02548 5C | Mohawk Point, Ontario, |
| W73-02519 4D | | W73-02504 2H |
| | CONSUMER PROTECTION AND | Development of Numerical Models of Lake |
| CLEMSON UNIV., S.C. DEPT. OF | ENVIRONMENTAL HEALTH SERVICE, | Ontario, |
| ENVIRONMENTAL SYSTEMS ENGINEERING. | WASHINGTON, D.C. Environmental Control Administration Water | W73-02511 2H |
| Design-Operation Interactions for Wastewater | Hygiene Programs, | |
| Treatment Plants, W73-02209 5F | W73-02125 5G | A Water Use Map of the Great Lakes Basin, W73-02512 2H |
| 113-02207 | | W73-02512 2H |
| COAST GUARD DISTRICT (13TH), SEATTLE, | CONVERSE, DAVIS AND ASSOCIATES, | DEPARTMENT OF ENERGY, MINES AND |
| WASH. CIVIL ENGINEERING BRANCH. | PASADENA, CALIF. | RESOURCES, OTTAWA (ONTARIO). POLAR |
| Marine Aids to Navigation - Selection and | Evaluation of Properties of Rockfill Materials, W73-02072 8D | CONTINENTAL SHELF PROJECT. |
| Design, | W 13-02012 | Some Observations on Superimposition of Ice |
| W73-02463 5C | COPENHAGNE UNIV. (DENMARK). | on the Devon Island Ice Cap, N.W.T., Canada, W73-02046 2C |
| COAST GUARD, WASHINGTON, D.C. | FRESHWATER BIOLOGICAL LAB. | 175-020-10 |
| Baltimore Harbor Outer Crossing (Patapsco | Oxidation-Reduction Potentials, Oxygen Con- | DEPARTMENT OF LANDS AND FORESTS, |
| River Bridge) Baltimore, Maryland (Final En- | centration and Oxygen Uptake of Profundal | MAPLE (ONTARIO). RESEARCH BRANCH. |
| vironmental Impact Statement). | Sediments in a Eutrophic Lake, W73-02451 5C | Under-Ice Observations of Wintering Sites of |
| W73-02518 8A | W73-02451 5C | Leopard Frogs, W73-02583 2C |
| COLD BECLOWE BECEARON AND | CORNELL UNIV., ITHACA, N.Y. | W73-02583 2C |
| COLD REGIONS RESEARCH AND | Thermal Effects of Power Plants on Lakes, | DEPARTMENT OF SCIENTIFIC AND |
| ENGINEERING LAB., HANOVER, N.H. On the Use of Stable Isotopes to Trace the | W73-02068 2H | INDUSTRIAL RESEARCH, WELLINGTON |
| Origins of Ice in a Floating Ice Tongue, | 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | (NEW ZEALAND). OCEANOGRAPHIC INST. |
| W73-02168 2C | Authorization and Appropriation Processes for Water Resource Development, | Circulation and Hydrology Under the Seasonal |
| | W73-02364 6E | Ice in McMurdo Sound, Antarctica, W73-02051 2C |
| Rotary Drilling and Coring in Permafrost: Part | 117-02304 | W73-02051 2C |
| III, Deep Core Drilling, Core Analysis and | CORPS OF ENGINEERS, HONOLULU, | Direct Observations of Columnar Scattering |
| Bore Hole Thermometry at Cape Thompson, | HAWAII. PACIFIC OCEAN ENGINEER DIV. | Associated with Geothermal Gas Bubbling in |
| Alaska, | Hawaii Regional Inventory of the National | the Bay of Plenty, New Zealand, |
| W73-02312 8B | Shoreline Study. | W73-02052 2L |
| Frost-Heaving Pressures, | W73-02321 8B | DEPARTMENT OF THE ENVIRONMENT, |
| W73-02371 2C | CORPS OF ENGINEERS, NEW YORK. NORTH | OTTAWA (ONTARIO). INLAND WATERS |
| *************************************** | ATLANTIC DIV. | BRANCH. |
| COLORADO STATE UNIV., FORT COLLINS. | National Shoreline Study, Regional Inventory | Analysis of Chlorinated Hydrocarbon Pesti- |
| Concentration of Brines by Spray Evaporation, | Report, North Atlantic Region. | cides in Waters and Wastewaters, |
| W73-02081 5E | W73-02186 8B | W73-02313 5A |
| COLORADO STATE UNIV., FORT COLLINS. | CORPS OF ENGINEERS, WALTHAM, MASS. | Research Projects in Glaciology, 1972. |
| DEPT. OF CIVIL ENGINEERING. | NEW ENGLAND DIV. | W73-02314 2C |
| A General Stochastic Model for the Transport | Maintenance Dredging, Chatham (Stage) Har- | |
| of Sediment Bed Material, | bor, Massachusetts (Draft Environmental Im- | DEPARTMENT OF THE INTERIOR, WASHINGTON, D.C. OFFICE OF LIBRARY |
| W73-02315 2J | pact Statement). | SERVICES. |
| | W73-02262 4A | Control of Aquatic Vegetation in Freshwater, |
| COLORADO UNIV., NEDERLAND. INST. OF | Newington Generating Station Unit No. 1, | W73-02444 4A |
| ARCTIC AND ALPINE RESEARCH. | Newington, New Hampshire (Draft Environ- | DOW COMPAGES OF THE STATE OF THE |
| Frost Cracking in the Colorado Front Range, W73-02043 2C | mental Impact Statement). | DOW CHEMICAL CO., LOS ANGELES, CALIF. DOWELL DIV. |
| W 73-02043 | W73-02514 8C | Secondary Depostion of Iron Compounds Fol- |
| CONNECTICUT UNIV., GROTON. MARINE | DATATRONIC SYSTEMS CORP., PANORAMA | lowing Acidizing Treatments, |
| SCIENCES INST. | CITY, CALIF. COMPUTER SCIENCES AND | W73-02420 8G |
| Winter Circulation in Lake Ontario, | ENVIRONMENTAL TECHNOLOGY DIV. | DON'T TAKE 1000 1000 1000 1000 1000 1000 1000 10 |
| W73-02509 2H | Environmental Quality. A Challenge for | Pollution of Subsurface Water by Sanitary |
| CONNECTICUT UNIV., STORRS. | Achievement, | Landfills. Vol 2. |
| Structural Aspects of Amide-Water Systems, | W73-02485 5G | W73-02106 5B |
| W73-02343 5A | DEGOLYER, MACNAUGHTON, AND | |
| W 13-04343 | MCGHEE, DALLAS, TEX. | Pollution of Surface Water by Sanitary Land- |
| Analysis of Residual Total Nitrogen in Waste- | Cable Tool Drilling, An Investigation of the | fills. Vol 3, |
| waters, | Relation Between the Natural Stroke Frequen- | W73-02107 5B |
| W73-02345 5A | cies of Cable-tool Systems and the Operating | DRILLING RESEARCH, INC., HOUSTON, TEX. |
| An Experimental Study of Wind-Generated | Strokes per Minute, | Some Results of Dri Investigations-Rock |
| Waves With and Without Pressure Gradient. | W73-02407 8G | Failure in Percussion, |
| W73-02346 2E | DELAWARE UNIV., NEWARK. DEPT. OF | W73-02406 8E |
| | GEOLOGY; AND DELAWARE UNIV., | ECONOMIC DEVELOPMENT |
| CONNECTICUT UNIV., STORRS. DEPT. OF | NEWARK. COLL. OF MARINE STUDIES. | ADMINISTRATION, CHICAGO, ILL. |
| ENVIRONMENTAL ENGINEERING. | A Mass Balance Model of Trace Metals in | MIDWESTERN REGION. |
| Measures of Organic Pollutants in Wastewater | Several Delaware WatershedsA Progress Re- | Leading Creek Conservancy District (Final En- |
| Treatment Plant Operations, W73-02334 5D | port, W73-02341 5B | vironmental Impact Statement). W73-02267 5F |
| W73-02334 5D | W73-02341 5B | W73-02267 5F |

ECC ADD WWW W ECC CALL OF THE WAR CONTROL OF THE WAR CONTROL OF THE WAR ENVIRONMENT OF THE WAR PROCESS WE WAS A WAY OF THE WAY OF T

FAI ANN H gi

FED WAN In W

| ECONOMIC DEVELOPMENT ADMINISTRATION, WASHINGTON, D.C. (Santa Rosan, Sonoma County, California, Sewer Collection and Water Distribution | FISHERIES RESEARCH BOARD OF CANADA, NANAIMO (BRITISH COLUMBIA). BIOLOGICAL STATION. Aspects of the Characterization, Identification, | FOREST SERVICE (USDA)., PORTLAND, OREG. PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION. Water Temperature in the Steamboat Drainage, |
|--|--|--|
| System), (Draft Environmental Impact State- | and Ecology of the Bacterial Flora Associated | W73-02567 4C |
| ment). W73-01996 3D | with the Surface of Stream-Incubating Pacific Salmon (Oncorhynchus) Eggs, W73-02565 | FRANKFURT UNIV. (WEST GERMANY). INSTITUTE OF PETROLOGY, |
| ECONOTECH SYSTEMS, INC., LOS ANGELES, | W /3-02363 81 | GEOCHEMISTRY AND STRATIFICATION. |
| CALIF. | Growth Responses of Young Sockeye Salmon | Geochemistry of Ground Waters from Burg El- Arab Area, Egypt, |
| Optimum Conjunctive Use of a Dual-Purpose | (Oncorhynchus nerka) to Different Diets and Planes of Nutrition, | W73-02053 2K |
| Desalting Plant and Multi-Purpose Surface Water Reservoirs. | W73-02571 8I | |
| W73-02083 3A | The second secon | FRITZ-HABER-INSTITUT DER MAX-PLANCK-GESELLSCHAFT, BERLIN |
| EDGEWOOD ARSENAL, MD. | FLORENCE UNIV. (ITALY). INST. OF | (WEST GERMANY). |
| Fish Populations Around Edgewood Arsenal's | GEOLOGY. Morphology and Recent Sediments of the | The Nitrate Reductase of Chlorella, W73-02476 5C |
| Chemical Agent Test Area, | Western Alboran Basin in the Mediterranean | CECT CCICAT STRUCK ATRANE NO |
| W73-02021 5C | Sea, W73-02494 2J | GEOLOGICAL SURVEY, ALBANY, N.Y. Low-Flow Study of Streams in Albany County, |
| ENVIRONMENTAL LAW INST., | | New York. |
| WASHINGTON, D.C. | FLORIDA STATE UNIV., TALLAHASSEE. | W73-02318 7C |
| Courts and Water, The Role of the Judicial | Reworked Palynomorphs from the West Ice | A Summary of Peak Stages and Discharges in |
| Process, W73-02365 6E | Shelf Area, East Antarctica, and Their Possible | New York for the Flood of June 1972, |
| | Geological and Palaeoclimatological Sig- | W73-02492 2E |
| ENVIRONMENTAL PROTECTION AGENCY, | nificance, W73-02495 | GEOLOGICAL SURVEY, AUSTIN, TEX. |
| CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB. | W73-02495 2J | Chemical Analyses of Water from Wells in |
| The Economics of Automation in Wastewater | FLORIDA UNIV., FORT LAUDERDALE. DEPT. | Harris County, Texas, 1922-71, W73-02038 2K |
| Treatment, | OF AGRONOMY. | W 73-02038 |
| W73-02293 5D | The White Amur for Aquatic Weed Control, W73-02010 4A | Index of Surface Water Stations in Texas, Oc- |
| ENVIRONMENTAL PROTECTION AGENCY, | W 73-02010 | tober 1972. W73-02311 7C |
| DALLAS, TEX. REGION VI. | FLORIDA UNIV., GAINESVILLE. | |
| Construction of Wastewater Facilities, Austin, | Measurement of Low Turbidities, | Annual Compilation and Analysis of Hydrolog- |
| Texas (Final Environmental Impact Statement). W73-01980 5D | W73-02147 5A | ic Data for Little Elm Creek, Trinity River Basin, Texas, 1970, |
| TOTAL TRANSPORT OF THE PARTY OF | FLORIDA UNIV., GAINESVILLE. DEPT. OF | W73-02324 7C |
| ENVIRONMENTAL PROTECTION AGENCY, PORTLAND, OREG. WATER QUALITY | ENVIRONMENTAL ENGINEERING. A Water Quality Model for a Conjunctive Sur- | Annual Compilation and Analysis of Hydrolog- |
| OFFICE. | face-Groundwater System: An Overview, | ic Data for Urban Studies in the Fort Worth, Texas, Metropolitan Area, 1970, |
| Legal Protection of the Pacific Northwest Estuaries, | W73-02178 5B | W73-02482 7C |
| W73-02459 5C | FLORIDA UNIV., GAINESVILLE. DEPT. OF | GEOLOGICAL SURVEY, BATON ROUGE, LA. |
| ENVIRONMENTAL PROTECTION AGENCY, | PLANT PATHOLOGY. Observations of Declining Water Lettuce Popu- | GROUND WATER BRANCH. |
| WASHINGTON, D.C. OFFICE OF WATER | lations in Lake Izabal, Guatemala, | Electric Logging Applied to Ground Water Ex- |
| PROGRAMS. | W73-02549 2H | ploration, W73-02402 8G |
| Wastewater Treatment Works Planning, Economics and Technology-Some New | FORD MOTOR CO., DETROIT, MICH. | |
| Directions, | ENVIRONMENTAL CONTROL SECTION. | GEOLOGICAL SURVEY, DENVER, COLO. A New Approach for Estimating Transmissi- |
| W73-02296 5D | Water for Industrial Needs: What, Where, When, | bility From Specific Capacity, W73-02398 |
| FAIRFAX COUNTY WATER AUTHORITY, | W73-02139 3E | W 73-02398 |
| ANNANDALE, VA. | | GEOLOGICAL SURVEY, FORT COLLINS, |
| High Rate Filtration in Fairfax County, Vir- ginia, | FOREST SCIENCE LAB., BOZEMAN, MONT. Weather Variations on a Mountain Grassland in | COLO. Serial-Correlation Structure of Discretized |
| W73-02146 5F | Southwestern Montana, | Streamflow, |
| | W73-02568 2B | W73-02323 2E |
| FEDERAL POWER COMMISSION, WASHINGTON, D.C. BUREAU OF POWER. | FOREST SERVICE (USDA), DURHAM, N. H. | GEOLOGICAL SURVEY, LAKEWOOD, COLO. |
| Niangua Hydro Project (Draft Environmental | NORTHEASTERN FOREST EXPERIMENT | Water Resources Data for Colorado, 1971: Part |
| Impact Statement). | STATION. | 2. Water Quality Records. W73-02039 2K |
| W73-02515 8C | Solar Radiation Absorption by Leafless Hard- | |
| Newhalem Creek Project, Washington (Draft | wood Forests, W73-02569 2I | GEOLOGICAL SURVEY, MADISON, WIS. |
| Environmental Impact Statement). | | Sediment Yields of Wisconsin Streams, W73-02152 7C |
| W73-02522 8C | FOREST SERVICE (USDA), OGDEN, UTAH. | |
| FENCO, TORONTO (ONTARIO). | INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION. | GEOLOGICAL SURVEY, MENLO PARK, |
| Uplift Computations for Masonry Dams, | Investigation of Slope Failures in the Idaho | CALIF. Time Stability of Aqueous APDC and Its Man- |
| W73-02080 8A | Batholith, | ganese and Nickel Complexes in MIBK, |
| FERGUSON AND MCILVEEN, BELFAST | W73-02564 2J | W73-02320 2K |
| (NORTHERN IRELAND). | Ponderosa Pine Planting Techniques, Survival | Hydrochemical Study of the National Reactor |
| The Asphaltic Lining of Dungonnel Dam, | and Height Growth in the Idaho Batholith, | Testing Station, Idaho, |
| W73-02073 8A | W73-02579 4A | W73-02484 5B |

IIT RESI
Techni
Laund
W73-0
ILLINOI
URBAN/
Glacia
W73-0
ILLINOI
Yields
linois,
W73-0

Yields Illinois W73-0 Yields pian R W73-0 ILLINO ENGINE Hydro W73-0 ILLINO GEOLO Hydra Migra W73-0 INDIAN Biolog W73-INSTIT VIENN Desig Plant: W73-INSTIT AGRON STATIO tion, W73-INSTIT (YUGO Chor phila gosla W73-INSTIT Bibli and 1965 Bibli W73-

INSTITUTE HAREIT CONTROL PAREIT FORM W73-INSTITUTE Effe Chlo (In F. W73-INSTITUTE CHICAGO (IN F. W73-IN

GEOLOGICAL SURVEY OF CANADA,

| GEOLOGICAL SURVEY OF CANADA, | GEORGIA UNIV., ATHENS. | HARVARD UNIV., CAMBRIDGE, MASS. |
|---|--|--|
| OTTAWA (ONTARIO). | Release of Dissolved Organic Matter by Marine | Kinetics of Biologically Mediated Aerobic Ox- |
| Seismic Profiling and Geology of the Toronto | Macrophytes, | idation of Organic Compounds in Receiving |
| Waterfront Area of Lake Ontario, | W73-02100 5C | Waters and in Waste Treatment, |
| W73-02501 2H | CROBCIA INIV. ATHENS DEPT OF | W73-02450 5C |
| GEOLOGICAL SURVEY OF ISRAEL, | GEORGIA UNIV., ATHENS. DEPT. OF GEOLOGY. | HAWAII UNIV., HONOLULU. DEPT. OF |
| JERUSALEM. MARINE GEOLOGY DIV. | Studies of Saprolite and Its Relation to the | BOTANY. |
| A Simple Device for the Sorting of Living | Migration and Occurrence of Groundwater in | Environments and the Distribution of |
| Planktonic Copepods, | Crystalline Rocks, | Microfungi in a Hawaiian Mangrove Swamp, |
| W73-02598 7B | W73-01955 2F | W73-02189 2I |
| ALCOHOL STORY | | and had reason that the bear book and real |
| GEOLOGICAL SURVEY OF QUEENSLAND, | GIESSEN UNIV. (WEST GERMANY). | HAWAII UNIV., HONOLULU. WATER |
| BRISBANE (AUSTRALIA). | LEHRSTUHL BOTANK (II). | RESOURCES RESEARCH CENTER. |
| A Shallow Artesian Aquifer in the Tertiary | Leaf Temperature and Transpiration Measure- | Collected Reprints, Volume II 1969-1970. |
| Deposits of Southern Cape York Peninsula, W73-02309 4B | ments of Tribulus Cistoides L. In Northern | W73-02347 4B |
| W /3-02309 | Colombia, W73-02195 2D | HAZEN AND SAWYER, NEW YORK. |
| GEOLOGICAL SURVEY, PORTLAND, OREG. | W/3-02193 | Oneida Shows the Way To Go, |
| Crest-Stage Gaging Stations in OregonA Com- | GOSUDARSTVENNYI GIDROLOGICHESKII | W73-02196 5D |
| pilation of Peak Data Collected from October | INSTITUT, LENINGRAD (USSR). | W /3-02190 |
| 1952 to September 1972, | Formation and Calculation of Elements of the | HELSINKI UNIV. (FINLAND). DEPT. OF |
| W73-02034 7C | Water Balance for Small Watersheds of | AGRICULTURAL CHEMISTRY. |
| CROLOCICAL CURVEY BORTLAND OBEC | Northern Kazakhstan (Formirovaniye i | Survival and Leaching of Fecal Streptococci |
| GEOLOGICAL SURVEY, PORTLAND, OREG. WATER RESOURCES DIV. | raschety elementov vodnogo balansa malykh | Under Field Conditions, |
| Radionuclides in Transport in the Columbia | vodosborov Severnogo Kazakhstana). | W73-02143 5B |
| River from Pasco to Vancouver, Washington, | W73-02065 2A | |
| W73-02022 5B | | HOLMES AND NARVER, INC., LAS VEGAS, |
| *************************************** | GOSUDARSTVENNYI MEDITSINSKII | NEV. |
| GEOLOGICAL SURVEY, SAN ANTONIO, TEX. | INSTITUT, DONETSK (USSR). | Full Core Recovery in Unconsolidated Forma- |
| Chemical Analyses of Water From Observation | Effect of Donetsk Mineral Water on the Clini- | tions, |
| Wells in the Edwards and Associated | cal Course of Chronic Cholangiohepatitis, (In | W73-02390 8G |
| Limestones, San Antonio Area, Texas, 1967. | Russian), W73-02002 5C | HONEYWELL, INC., FORT WASHINGTON, |
| W73-02307 2K | W73-02002 5C | PA. INDUSTRIAL DIV. |
| Records of Precipitation, Aquifer Head, and | GOTEBORG UNIV. (SWEDEN). INST. OF | Water Quality Characteristics and Their Mea- |
| Ground-Water Recharge to the Edwards and | SYSTEMATIC BOTANY. | surement, |
| Associated Limestones, San Antonio Area, | The Littoral Vegetation at Lake Mjorn in | W73-02427 5A |
| Texas,-1968. | Western Vastergotland, (In Swedish), | Charles and Charle |
| W73-02308 2F | W73-02104 2H | HOUSE, WASHINGTON, D. C. |
| and the form A Management Round | | Repair and Protect Our Natural Environment, |
| GEOLOGICAL SURVEY, WASHINGTON, D.C. | GREAT NORTHERN PAPER CO., | W73-01993 6E |
| An Automated System for Determining | MILLINOCKET, MAINE. | |
| Estuarine Bathymetry, | Magnesium Bisulfite Recovery Startup, | Rodman Drawdown Saves Trees, W73-02258 6E |
| W73-02317 7B | W73-02224 5D | W 73-02258 |
| Average Water Content of Snowpack in Maine, | GRONINGEN RIJKSUNIVERSITEIT | Analysis of Actions of the United Nations |
| W73-02326 7C | (NETHERLANDS). GEOLOGICAL INST. | Seabeds Committee, |
| | Tentative Data on Flow Resistance in Suspen- | W73-02527 6E |
| Floods in the Aguadilla-Aguada Area, | sion Currents, | |
| Northwestern Puerto Rico, | W73-02156 2J | Oil Pollution Act Amendments of 1972 (H.R. |
| W73-02327 7C | | 15627), |
| The Syslab System for Data Analysis of Histor- | GULF RESEARCH AND DEVELOPMENT CO., | W73-02528 6E |
| ical Water-Quality Records (Basic Programs), | PITTSBURGH, PA. Compositional Logging of Air-Drilled Wells, | The Mexican Water Treaty and its Relationship |
| W73-02437 7C | W73-02377 8B | to Colorado River Water Supplies, |
| | #13-02311 6B | W73-02529 5G |
| Geophysical, Geohydrological, and Geochemi- | Log Interpretations in Sandstone Reservoirs, | |
| cal Reconnaissance of the Luke Salt Body, | W73-02423 4B | Conference Report on the Federal Water Pollu- |
| Central Arizona, W73-02480 2F | The New York and the Parkers | tion Control Act Amendments of 1972, |
| W 73-02480 2F | GUYTON (WILLIAM F.) AND ASSOCIATES, | W73-02530 5G |
| Characteristics of Estuarine Sediments of the | AUSTIN, TEX. | HUMBLE OIL AND REFINING CO., HOUSTON, |
| United States, | Ground-Water Conditions in Anderson, | TEX. |
| W73-02481 2L | Cherokee, Freestone, and Henderson Counties, | Carrying Capacity of Drilling Muds, |
| 2.90 | Texas. W73-02049 7C | W73-02379 8B |
| GEOLOGICAL SURVEY, WASHINGTON, D.C. | W 73-02049 | 1173-02575 |
| WATER RESOURCES DIV. | HALLIBURTON OIL WELL CEMENTING CO., | HUNTING TECHNICAL SERVICES LTD., |
| Flow Routing Models for Stream System Stu- | DUNCAN, OKLA. | LAHORE (PAKISTAN). |
| dies, W73-02176 2E | Electrical Well Logging Fundamentals, | Readers Comment on Step Drawdown Test, |
| 25 | W73-02392 8B | W73-02419 8G |
| GEORGIA INST. OF TECH., ATLANTA. | FULL COLUMN TO THE WAY TO NO. | HIVOCO PREPERCATION TO THE PROPERTY OF THE PRO |
| ENVIRONMENTAL RESOURCES CENTER. | HANNOVER. TECHNISCHE UNIVERSITAET, | HYOGO PREFECTURE FISHERIES |
| Transition Metals of Impounded Waters, | HANOVER (WEST GERMANY). INSTITUT | EXPERIMENT STATION, AKASHI (JAPAN). |
| W73-01953 5B | FUER SIEDLUNGSWASSERWIRTSCHAFT. | The Hydrological Conditions for the Entry of |
| A Study of the Effects of Island Davidson | Economic Limit for the Amount of Reserve | Sagitta Enflata Into Osaka Bay: II. In The Case |
| A Study of the Effects of Island Development on Lake Water Quality. | Capacity on Construction of Sewage Treatment Plants for Rapidly Growing Municipalities, | of Appearance of a Cold Water Mass (In Japanese), |
| W73-01954 5C | W73-02211 5D | W73-02587 2L |
| | | |

| HT RESEARCH INST., CHICAGO, ILL. | INSTITUTE OF GEOGRAPHY OF SIBERIA | IOWA UNIV., IOWA CITY. INST. OF |
|--|--|--|
| Technical Evaluation of Phosphate-Free Home | AND THE FAR EAST, IRKUTSK (USSR). | HYDRAULIC RESEARCH. |
| Laundry Detergents, | Snow Structure and Snow Regime of the West | A Unified View of the Law of the Wall Using |
| W73-02351 5C | Siberian Taiga (Struktura i rezhim snezhnoy tolshchi zapadmosibirskoy taygi). | Mixing-Length Theory, W73-02306 8B |
| ILLINOIS STATE GEOLOGICAL SURVEY, | W73-02063 2C | W 75-02500 |
| URBANA. | | JAGELLONIAN UNIV., KRAKOW (POLAND). |
| Glacial-Drift Gas in Illinois, | INSTITUTE OF NUCLEAR RESEARCH, | DEPT. OF SYSTEMATICS, GEOGRAPHY AND |
| W73-02391 8D | WARSAW (POLAND). | BOTANICAL GARDEN. |
| ILLINOIS STATE WATER SURVEY, URBANA. | Physical Chemistry of Extraction Processes, | Tsuga Heterophylla Forest at Lake McDonald, |
| Yields of Deep Sandstone Wells in orthern Il- | W73-02014 1B | Glacier National Park, U.S.A., and its |
| linois. | INSTITUTL AGRONOMIC DIN TIMISOARA | Phytogeography, W73-02201 4A |
| W73-02386 3B | (RUMANIA). | 117-02201 |
| La National Service Communication | Aquatic and Marsh Vegetation of the Timis- | JERSEY PRODUCTION RESEARCH CO., |
| Yields of Shallow Dolomite Wells in Northern | Bega Interfluvial Zone, | TULSA, OKLA. |
| Illinois, W73-02399 4B | W73-02316 4A | Cement Bond Logging, an Aid to Better |
| W 13-02335 | INSTITUTO NACIONAL DE LIMNOLOGIA, | Completion Practices, W73-02385 8F |
| Yields of Wells in Pennsylvanian and Mississip- | SANTO TOME (ARGENTINA). | W /3-02383 |
| pian Rocks in Illinois, | New Cases of Aquatic Epiphytes, (In Spanish), | JOHNS HOPKINS UNIV., BALTIMORE, MD. |
| W73-02400 4B | W73-02551 2I | CHESAPEAKE BAY INST. |
| ILLINOIS UNIV., URBANA. DEPT. OF | BYTO YOU THEN AND DO A VINCE AND THE | Suspended Sediment Discharge of the |
| ENGINEERING. | INTERNATIONAL NUTRONICS, INC., LOS | Susquehanna River at Conowingo, Maryland, |
| Hydrologic Modeling, | ALTOS, CALIF. | During 1969, |
| W73-02547 2A | Neutron Activation Analysis of Water-A | W73-02445 2J |
| | Review, W73-02166 5A | JOHNSON (EDWARD E.), INC., ST. PAUL, |
| ILLINOIS UNIV., URBANA. DEPT. OF | W/3-02100 | MINN. |
| GEOLOGY. | INTERNATIONAL PACIFIC HALIBUT | The Technical Aspects of Gravel Well Con- |
| Hydraulic Parameters Controlling Bedform | COMMISSION, SEATTLE, WASH. | struction, |
| Migration on an Intertidal Sand Body, W73-02489 2L | Evaluation of a Winter Steelhead Fishery on a | W73-02393 8A |
| W 13-02409 | Western Washington River, | WANGAG OFFICE CINES AND MINISTER OF AND THEFT |
| INDIANA UNIV., BLOOMINGTON. | W73-02575 8I | KANSAS STATE UNIV., MANHATTAN. DEPT. OF CHEMICAL ENGINEERING. |
| Biological Effects of Trinitrotoluene (TNT), | INTERNATIONAL PACIFIC SALMON | Efficiency and Utility of Collocation Methods |
| W73-02101 5C | FISHERIES COMMISSION, CULTUS LAKE | in Solving the Performance Equations of Flow |
| INSTITUT FUER WASSERVERSORGUNG, | (BRITISH COLUMBIA). CULTUS LAKE LAB. | Chemical Reactors with Axial Dispersion, |
| VIENNA (AUSTRIA). | A Study of Sediments from Bellingham Harbor | W73-02552 5D |
| Design Considerations for Large Treatment | as Related to Marine Disposal, | |
| Plants. | W73-02461 5C | Modeling and Optimization of a Tower-Type |
| W73-02213 5D | INTERUNIVERSITAIR REACTOR INSTITUUT, | Activated Sludge System, W73-02553 5D |
| THE STATE OF THE S | DELFT (NETHERLANDS). | W 73-02333 |
| INSTITUT NATIONAL DE LA RECHERCHE | Automated Separations in Routine Activation | Modeling and Analysis of Washout in Tower |
| AGRONOMIQUE, ROUEN (FRANCE). STATION AGRONOMIQUE. | Analysis of Mercury, | Fermentation Processes, |
| The Content of Various Elements in Precipita- | W73-02015 5A | W73-02554 5D |
| tion, | TOWA OF A TRUIT A MEC CENTER POR | KANSAS UNIV., LAWRENCE. |
| W73-02588 2K | IOWA STATE UNIV., AMES. CENTER FOR AGRICULTURAL AND RURAL | A Simple Apparatus for Measuring Activity |
| NOTIFIE TA BIOLOGIO CATH I HIBI IANA | DEVELOPMENT. | Patterns of Fishes, |
| INSTITUT ZA BIOLOGIJO SAZU, LJUBLJANA | Alternative Demands for Water and Land for | W73-01977 SA |
| (YUGOSLAVIA). Chorology, Ecology and Sociology of Chima- | Agricultural Purposes, | |
| phila Umbellata (L.) Bart. In Slovenia (Yu- | W73-02363 6D | KENOSHA WATER DEPT., WIS. |
| goslaviaia), | TOWA CHAPP TIME AMPC DEBT OF | Kenosha Increases Plant Capacity with Micros- |
| W73-02272 2I | IOWA STATE UNIV., AMES. DEPT. OF BOTANY AND PLANT PATHOLOGY. | trainers, W73-02426 5F |
| PARTITION OF THE PARTITION (1908) | Diatoms from Seven Iowa Rivers. | W73-02426 5F |
| INSTITUT ZEMNOI KORY, IRKUTSK (USSR). Bibliography on the Hydrogeology of Siberia | W73-02011 2I | KENTUCKY UNIV., LEXINGTON. DEPT. OF |
| and the Soviet Far East for the Period 1918- | 177-02011 | CIVIL ENGINEERING. |
| 1965 (Gidrogeologiya Sibiri i Dal'nego Vostoka. | IOWA STATE UNIV., AMES. DEPT. OF EARTH | Evaluating Recreational Potential of Small |
| Bibliograficheskiy ukazatel'. 1918-1965), | SCIENCES. | Streams, |
| W73-02058 2F | Recharge to Ground Water from the West | W73-02297 6B |
| are the field and red the second of the second of | Nishnabotna River, W73-02033 4B | Finite Element Analysis of Flow Toward Arte- |
| INSTITUTE FOR SOIL PERTILITY, | W73-02033 4B | sian Well, |
| HAREN-GRONIGEN (NETHERLANDS). Contents and Behaviour of Mercury as Com- | IOWA UNIV., IOWA CITY. DEPT. OF | W73-02340 2F |
| pared with Other Heavy Metals in Sediments | ECONOMICS. | |
| from the Rivers Rhine and Ems, | Economic Analysis of Alternative Water Pollu- | KIEL UNIV. (WEST GERMANY). INSTITUT |
| W73-02158 5B | tion Control Measures, | FUER MEERESKUNDE. |
| THE RESERVE OF CENTRE AND ADDRESS OF THE PARTY OF THE PAR | W73-02550 5G | Investigations on the Loading of the Untertrave |
| INSTITUTE OF GENERAL AND MUNICIPAL | IOWA UNIV., IOWA CITY. DEPT. OF URBAN | with Sewage, (In German), |
| HYGIENE, MOSCOW (USSR). Effect of Drinking Water with Different | AND REGIONAL PLANNING. | W73-02016 5C |
| Chloride Contents on Experimental Animals, | Water Quality Management, An Analysis of In- | Biomass and Production of Macrobenthos in |
| (In Russian), | stitutional Patterns, | the Deeper parts of Kiel Bay in 1968, |
| W73-02020 5C | W73-01978 5G | |

| KIEV RESEARCH INST. OF GENERAL | LUND (G. G. A.), JOHANNESBURG (SOUTH | The Framework for Analysis, |
|---|--|---|
| COMMUNAL HYGIENE (USSR). Characterization of Phenols in Areas of Water | AFRICA). Reservoir Yield in Arid Regions with Limited | W73-02300 |
| 'Blooming' in Open Bodies of Water, | Records, | Offshore Siting of Electric Power Plants, |
| W73-02460 5C | W73-02545 2A | W73-02301 |
| KINGSWOOD SCHOOL, WEST HARTFORD, | MAGYAR TUDOMANYOS AKADEMIA, TIHANY (HUNGARY). BIOLOGICAL | The Crisis in Shoreline Recreation, |
| CONN. Pave the Wetlands or Let Them Be, | RESEARCH INST. | W73-02302 |
| W73-02252 6E | Weekly Changes of the Bacterio- and | Water Quality Improvement in Boston Ha |
| KOMENSKEHO UNIVERSITA, BRATISLAVA | Phytoplankton Standing Stock in Lake Balaton and in the Highly Eutrophic Lake Belso, | W73-02303 |
| (CZECHOSLOVAKIA). | W73-02594 5C | MASSACHUSETTS UNIV., AMHERST. DE |
| Vegetation of the Area of the Future Reservoir on the Klenovska Rimava, | Comparative Investigations on the Benthic | OF CIVIL ENGINEERING. Removal of Toxic Pesticides by Reverse C |
| W73-02087 2I | Fauna at Two Sewage Inflows of Lake Balaton. | sis Water Treatment, |
| LABORATOIRE DE BIOLOGIE VEGETALE, | W73-02595 SC | W73-02222 |
| NANCY (FRANCE). Hydrobiological Research on Amsterdam | MAHER (D. L.) CO., WOBURN, MASS. | MEDITSINSKII INSTITUT, GORKII (USSB |
| Island: 1969-1970 Exploratory Campaign, | Testing for and The Development of Ground | On the Significance of Urochrome in En |
| W73-02582 21 | Water Supplies, W73-02412 4B | Goiter, |
| LANTBRUKHOGSKOLAN, UPPSALA | MAINE UNIV., ORONO. DEPT. OF CIVIL | W73-02425 |
| (SWEDEN). Effect of Foliar Spray and Soil Application of | ENGINEERING. | METROPOLITAN WASHINGTON COUNC |
| CCC on Transpiration and Dry Matter Produc- | Virucidal Effects of Chlorine in Wastewater, W73-02538 5D | OF GOVERNMENTS, D.C. Proposed Experimental Programs for T |
| tion of Spring Wheat, W73-02499 2D | | Remote Sensor Applications in |
| LAVAL UNIV., QUEBEC. DEPARTEMENT DE | MAINE UNIV., ORONO. DEPT. OF SOIL SCIENCES. | Metropolitan Washington Area, |
| BIOLOGIE. | Effect of Animal Wastes Applied to Soils on | W73-02491 |
| Quantitative Fluctuations in the Zooplankton of the Baie-Des-Chaleurs (Saint-Lawrence Gulf): | Surface and Ground Water Systems, W73-01960 5B | MICHIGAN DEPT. OF NATURAL RESOUR MARQUETTE. MARQUETTE FISHERIES |
| III. Fluctuations in Copepods Other Than | MAINE UNIV., ORONO. DEPT. OF ZOOLOGY. | RESEARCH STATION. |
| Calanus, W73-02570 2L | Further Ultrasonic Tracking and Tagging Stu- | Age, Growth, and Downstream Migrati |
| | dies on Homing Cutthroat Trout (Salmo clarki) in Yellowstone Lake, | Juvenile Rainbow Trout (Salmo gairdner Lake Michigan Tributary, |
| LAYNE AND BOWLER, INC., MEMPHIS, TENN. | W73-02577 2H | W73-02574 |
| Well Grouting and Well Protection, | MAIZE RESEARCH INST., KNEZHA | Utilization of Alewives by Inshore Pisciv |
| W73-02408 8F | (BULGARIA). Agrometeorological Conditions and Charac- | Fishes in Lake Michigan, W73-02578 |
| LAYNE TEXAS CO., INC., HOUSTON, TEX. Photographic Examination of Wells, | teristics of the Maize Development in the Plant- | 1100000 |
| W73-02409 8G | ing-Sprouting Period, (In Bulgarian), W73-01999 3F | MICHIGAN STATE UNIV. EAST LANSING KEDZIE CHEMICAL LAB. |
| LEHIGH UNIV., BETHLEHEM, PA. CENTER | | Some Studies on the Chronic Toxicity of |
| FOR MARINE AND ENVIRONMENTAL | MANITOBA UNIV., WINNIPEG. DEPT. OF ENTOMOLOGY. | mium and Hexavalent Chromium in Di Water, |
| STUDIES. Zooplankton of the Sandy Bay Area, N.J., | Metabolism of DDT by Fresh Water Diatoms, | W73-02428 |
| W73-02448 5C | W73-02280 5C | MICHIGAN TECHNOLOGICAL UNIV., |
| LEHIGH UNIV., BETHLEHEM, PA. DEPT. OF | MARINE SCIENCE INST., BAYOU LA BATRE, ALA. | HOUGHTON. DEPT. OF CIVIL ENGINEES |
| BIOLOGY. | Ecological Effects of Offshore Construction, | Control of Nitrate Contamination of G Water Associated with Land Disposal of |
| Automatic System for Monitoring Water Quali- ty, | W73-02029 5C | nicipal Sewage, |
| W73-02432 5A | MARYLAND UNIV., COLLEGE PARK. DEPT. | W73-02111 |
| LIVERPOOL UNIV. (ENGLAND). DEPT. OF | OF CIVIL ENGINEERING. Nonparametric Statistical Methods in Urban | MICHIGAN UNIV., ANN ARBOR. DEPT. O |
| ZOOLOGY. The Effect of Water Level Fluctuations on a | Hydrologic Research, W73-02175 4C | METEOROLOGY AND OCEANOGRAPHY Diving Techniques Used in the Study of |
| Littoral Fauna, | | romanganese Nodule Deposits, |
| W73-02477 5C | A Nomograph Based on Kinematic Wave Theory for Determining Time of Concentration | W73-02513 |
| LONDON UNIV. (ENGLAND); AND | for Overland Flow, | MICHIGAN UNIV., ANN ARBOR. GREAT |
| WESTFIELD COLL., LONDON (ENGLAND). DEPT. OF BOTANY. | W73-02322 8B | LAKES RESEARCH DIV. A Regional Geophysical Investigation |
| Nitrogen Fixation in Lakes, | MARYLAND UNIV., SOLOMONS. NATURAL RESOURCES INST. | Green Bay Area, |
| W73-02472 5C | Temperature Tolerance and Thyroid Activity of | W73-02502 |
| LOUISIANA STATE UNIV., BATON ROUGE. COASTAL STUDIES INST. | the White Perch Roccus (±Morone) Americanus, | MINISTERSTVO ZDRAVOOKHRANENIY |
| Hydrometeorological Relationships and Their | W73-02273 5C | SSSR, MOSCOW. Studies of the Effect of Desalinated D |
| Effects on the Levees of a Small Arctic Delta, W73-02041 8D | MASSACHUSETTS INST. OF TECH., | Water on the Functional State of the Org |
| | CAMBRIDGE. SEA GRANT PROJECT OFFICE. | W73-02091 |
| LOUISIANA WATER RESOURCES RESEARCH INST., BATON ROUGE. | Power, Pollution, and Public Policy, Issues in Electric Power Production, Shoreline Recrea- | MINNESOTA MINING AND MFG. CO., ST |
| A Re-Examination of the Common Pool Problem. | tion, and Air and Water Pollution Facing New England and the Nation. | PAUL. Microbiological Corrosion of Iron and St |
| W73-01956 4B | W73-02299 6G | W73-02403 |

| W73-02300 | 6G |
|---|-------------------------|
| Offshore Siting of Electric Power Plants, W73-02301 | 6G |
| The Crisis in Shoreline Recreation, W73-02302 | 6G |
| Water Quality Improvement in Boston Ha W73-02303 | rbor, 6G |
| MASSACHUSETTS UNIV., AMHERST. DE OF CIVIL ENGINEERING. Removal of Toxic Pesticides by Reverse (| |
| sis Water Treatment, W73-02222 | 5D |
| MEDITSINSKII INSTITUT, GORKII (USSR DEPT. OF HYGIENE. On the Significance of Urochrome in En- | |
| Goiter, W73-02425 | 5F |
| METROPOLITAN WASHINGTON COUNC OF GOVERNMENTS, D.C. Proposed Experimental Programs for T Remote Sensor Applications in Metropolitan Washington Area, | |
| W73-02491 | 7B |
| MICHIGAN DEPT. OF NATURAL RESOUR MARQUETTE. MARQUETTE FISHERIES RESEARCH STATION. | |
| Age, Growth, and Downstream Migrati Juvenile Rainbow Trout (Salmo gairdner Lake Michigan Tributary, | |
| W73-02574 | 81 |
| Utilization of Alewives by Inshore Pisciv Fishes in Lake Michigan, | |
| W73-02578 MICHIGAN STATE UNIV. EAST LANSING KEDZIE CHEMICAL LAB. Some Studies on the Chronic Toxicity of mium and Hexavalent Chromium in Dr | Cad- |
| Water, W73-02428 | 5C |
| MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON. DEPT. OF CIVIL ENGINEER Control of Nitrate Contamination of G Water Associated with Land Disposal on nicipal Sewage, W73-02111 | round |
| MICHIGAN UNIV., ANN ARBOR. DEPT. O METEOROLOGY AND OCEANOGRAPHY | |
| Diving Techniques Used in the Study of romanganese Nodule Deposits, | f Fer- |
| W73-02513 MICHIGAN UNIV., ANN ARBOR. GREAT LAKES RESEARCH DIV. | 2Н |
| A Regional Geophysical Investigation Green Bay Area, W73-02502 | |
| W 73-02302 MINISTERSTVO ZDRAVOOKHRANENIY | 2H |
| SSSR, MOSCOW. Studies of the Effect of Desalinated Desalinated Desalinated Desalinated Org. Water on the Functional State of the Org. W73-02091 | rinking anism, 5F |
| MINNESOTA MINING AND MFG. CO., ST PAUL. | r. |
| Microbiological Corrosion of Iron and St W73-02403 | eel, 8G |
| | |

MINNESO OF PUBL

Taxono Superio W73-02

Pollutio Periphy Calefac W73-02

MINNESC RESOUR Influence and Qua W73-01 MINNESC HORTICE A Study Potato Bean (F W73-01 The Int IV. Tut W73-01

The Ini Cooling Plants, W73-01

The In II. Gro W73-02

The In III. Nu W73-02

MISSISS FOREST COLLEG Effect Conter Soils, W73-0 MISSISS DEPT. O Water System W73-0 MISSOU Effect W73-0 MISSOU METAL The I Micell W73-0 MISSOU Heavy with gent F W73-0 Salt P W73-0 Mobil W73-4 MONSA

Trace W73-

6G

| MINNESOTA UNIV., MINNEAPOLIS. SCHOOL | MONTANA STATE UNIV., BOZEMAN. | | NATIONAL OCEANOGRAPHIC |
|---|--|---------|--|
| OF PUBLIC HEALTH. | A Source Study of the Suspended Solids in | n the | INSTRUMENTATION CENTER, |
| Taxonomy of North Shore Periphyton, Lake | Gallatin River, | - | WASHINGTON, D.C. |
| Superior, Castle Danger Studies 1970-1971, W73-02555 SC | W73-02559 | 5B | A Quantitative Evaluation of Dissolved Oxygen |
| W 13-02333 3C | MONTANA UNIV., MISSOULA, DEPT. OF | | Instrumentation, W73-02165 5B |
| Pollution and the Ecology of Nearshore | RESOURCES CONSERVATION. | | W /3-02160 |
| Periphyton of Lake Superior: The Effects of | The Response of Root and Shoot Growi | th to | NATIONAL RESEARCH COUNCIL OF |
| Calefaction on Periphyton, | Decreases in Soil Water Potential, | | CANADA, OTTAWA (ONTARIO). ASSOCIATE |
| W73-02556 5C | W73-02558 | 21 | COMMITTEE ON GEOTECHNICAL |
| MINNESOTA UNIV., MINNEAPOLIS. WATER | MONTREAL UNIV. (QUEBEC), DEPT. OF | | RESEARCH. |
| RESOURCES RESEARCH CENTER. | BIOLOGICAL SCIENCES. | | Summary of Current Research on Snow and |
| Influence of Mist Irrigation on Growth, Yields, | The Gaspe Cod Ecosystem in the Guif of | of St. | Ice in Canada. |
| and Quality of Potatoes and Snap Beans, | Lawrence: II, Weekly Fluctuations of (| Com- | W73-02310 2C |
| W73-01966 3F | mercial Trawl Catches of Cod With Depth | h and | NATIONAL RESEARCH COUNCIL OF |
| MINNESOTA UNIV., ST. PAUL. DEPT. OF | Temperature in 1960-1962, | | CANADA, OTTAWA (ONTARIO). DIV. OF |
| HORTICULTURAL SCIENCE. | W73-02581 | 2L | CHEMISTRY. |
| A Study of the Effects of Mist Irrigation on the | MOSCOW STATE UNIV. (USSR). | | Studies on Reverse Osmosis for Water Pollu- |
| Potato (Solanum tuberosum L.) and the Snap | Soil Erosion and Channel Processes. N | lo. 2. | tion Control, |
| Bean (Phaseolus vulgaris L.), | (Eroziya pochv i ruslovyye protsessy. Vy | pusk | W73-02225 5D |
| W73-01967 3F | 2.). | | NATIONAL WATER COMMISSION, |
| The Influence of Mist Irrigation on the Potato | W73-02062 | 23 | ARLINGTON, VA. |
| IV. Tuber Quality Factors, | MOSCOW STATE UNIV. (USSR). DEPT OF | | Water Pollution Control in the United States. |
| W73-01968 3F | INVERTEBRATE ZOOLOGY. | | W73-02366 5G |
| The Influence of a Short Period of Evaporative | Comparative Study of the Ecology of Free | | |
| Cooling on the Distribution of 14C in Potato | ing Ciliates in the Rugozersky Inlet (| (Kan- | Water Resource Planning. |
| Plants, | dalaksha Bay, White Sea), | | W73-02368 6B |
| W73-01969 3F | W73-02585 | 5C | NATIONAL WEATHER SERVICE, NEW |
| land and an account of the state of | MUSEUM NATIONAL D'HISTOIRE | | BRUNSWICK, N.J. |
| The Influence of Mist Irrigation on the Potato: | NATURELLE, PARIS (FRANCE). | | Meteorological and Hydrological Analysis of |
| II. Growth and Development, W73-02441 3F | Ecological Observations on Soldanella V | illosa | the August 27-28, 1971, New Jersey Flood, |
| W 73-02441 3F | Darracq, | | W73-02174 2A |
| The Influence of Mist Irrigation on the Potato: | W73-02217 | 21 | |
| III. Nutrient Content of Leaves, | NATIONAL AERONAUTICS AND SPACE | | NATIONAL WEATHER SERVICE, SALT LAKE |
| W73-02442 3F | ADMINISTRATION, MOFFETT FIELD, CA | LIF. | CITY, UTAH. WESTERN REGION. |
| MISSISSIPPI AGRICULTURAL AND | AMES RESEARCH CENTER. | | Arizona Floods of September 5 and 6, 1970. |
| FORESTRY EXPERIMENT STATION, STATE | Effects of Skylight Polarization, Clouds | | W73-02325 2E |
| COLLEGE. | and View Angle on the Detection of O | Dil on | NATIONAL WEATHER SERVICE, SILVER |
| Effect of Temperature on Pressure Head-Water | Water, | | SPRING, MD. |
| Content Relationship and Conductivity of Two | W73-02183 | 5A | Hydrologic Data Collection Via Geostationary |
| Soils, | NATIONAL COUNCIL ON MARINE | | Satellite, |
| W73-02339 2G | RESOURCES AND ENGINEERING | | W73-02036 7A |
| MISSISSIPPI STATE UNIV., STATE COLLEGE. | DEVELOPMENT, WASHINGTON, D.C. | | NAUCHNO-ISSLEDOVATELSKII INSTITUT |
| DEPT. OF CIVIL ENGINEERING. | Recent Federal Policies Affecting M | farine | GIGIENY, MOSCOW (USSR). |
| Water Quality Changes in the Distribution | Science and Engineering Development, | 5C | The Effects on Man of Low Concentrations of |
| System, | W73-02466 | 30 | Uranium. |
| W73-02430 5F | NATIONAL ENVIRONMENTAL RESEARC | H | W73-02429 5C |
| MISSOURI UNIV., COLUMBIA. | CENTER, CINCINNATI, OHIO. ANALYTIC | CAL | |
| Effect of Well Screens on Flow Into Wells, | QUALITY CONTROL LAB. | | NAVAL ACADEMY, ANNAPOLIS, MD. DEPT. |
| W73-02389 8B | Laboratory Methods for the Measureme | ent of | OF ENVIRONMENTAL SCIENCES. |
| MICCOURTING POLICE BERM OF | Pollutants in Water and Waste Effluents, W73-02167 | 5A | Physical-Chemical Crisis Indicators-Are There |
| MISSOURI UNIV., ROLLA. DEPT. OF METALLURGICAL ENGINEERING. | W /3-0216/ | 3/4 | Any, W73-02150 5A |
| The Effects of Divalent Metal Ions on the | Methods for Organic Pesticides in Wate | er and | W/3-02130 |
| Micellar Properties of Sodium Dodecyl Sulfate, | Wastewater. | | NAVAL POSTGRADUATE SCHOOL, |
| W73-02557 2K | W73-02436 | 5A | MONTEREY, CALIF. |
| | NATIONAL MARINE WATER QUALITY L | AR | Optical Signatures of the Near-Shore Waters of |
| MISSOURI WATER RESOURCES RESEARCH | WEST KINGSTON, R. I. | areare, | Southern Monterey Bay, |
| CENTER, ROLLA. Heavy Metal Ion Interaction and Transport | Pesticide-Induced Stress Profiles, | | W73-02027 5A |
| with Synthetic Complexing Agents and Deter- | W73-02274 | 5C | NAVAL SHIP SYSTEMS COMMAND. |
| gent Phosphate Substitutes in Aquatic Systems, | Planental Communistry of the Par | unule s | WASHINGTON, D.C. |
| W73-02112 5A | Elemental Composition of the Esta Teleost Fundulus Heteroclitus (L.), | uarine | Environmental Monitoring and Disposal of |
| Cate Balletian of Court & W. | W73-02278 | 5C | Radioactive Wastes from U.S. Naval Nuclear- |
| Salt Pollution of Ground Water, W73-02113 5B | 11 /3-042/0 | 20 | Powered Ships and Their Support Facilities, |
| W 13-04113 | NATIONAL OCEANIC AND ATMOSPHER | IC | W73-01982 5B |
| Mobilities of Injected Ions in Liquid Water, | ADMINISTRATION, BOULDER, COLO. | | NAVAL UNDERCEA DECEARCH AND |
| W73-02114 5A | ATMOSPHERIC PHYSICS AND CHEMIST | RY | NAVAL UNDERSEA RESEARCH AND |
| MONSANTO CO., DAYTON, OHIO. | LAB. Design, Execution, and Results of a Mese | necele | DEVELOPMENT CENTER, SAN DIEGO, CALIF. |
| Trace-Quantity Engineering, | Snowstorm Modification Project, | Covale | Sound Attenuation in Marine Sediments, |
| 1120 Quantity Engineering, | W73_02483 | 20 | W73-02467 21 |

PACIFIC CORVAL Applic Pacific W73-0

PEDIAT LENING Effect (Cu, Metal W73-4

PENNST PARK. Accus Tissus and Waste W73-4

PETRO COLO. Speci Data, W73-

PHILA Mans Proce W73-

PHILL Volu W73

PITTS: SCHOOL Effe Susp velir W73

PITTS OF EC The Zoo W73

POLIS ZAKL The Bloc Car W7:

Dac Vist

PSZC SCIEI STAT Ove kov W7

PUES MAR The and Sul W7

PUEI RESC De So Ty Ric W

| NEBRASKA UNIV., LINCOLN. DEPT. OF | Sewer Surcharges and Their Effect on Water, | OHIO STATE UNIV., COLUMBUS, WATER RESOURCES CENTER. |
|---|--|--|
| ZOOLOGY. | W73-02360 SG | Chemical and Sediment Movement from |
| The Impact of Reduced Light Penetration on a Eutrophic Farm Pond, | The Industrial Demand for Water and Waste | Agricultural Land into Lake Erie, |
| W73-02349 SC | Treatment in Selected U.S. Cities Which are | W73-01957 5B |
| W 13-023-13 | Levying Surcharges, | |
| NEPTUNE MICROFLOC, INC., CORVALLIS, | W73-02361 5G | Determination of Trace Metal Pollutants in |
| OREG. | NORTH CAROLINA STATE UNIV., RALEIGH. | Water Resources and Sediments, W73-01958 SA |
| Filtration Boasts Tertiary Treatment, Mixed- Media Filters, Plus Filter Aids, Turn in a Top | SCHOOL OF FOREST RESOURCES. | W73-01958 SA OHIO UNIV., ATHENS, DEPT, OF CIVIL |
| Performance, | An Analysis of Forested Watershed Land of | ENGENEERING. |
| W73-02229 SD | the Cape Fear River Basin Using a Computer- Oriented Alphanumeric Map Information As- | A Hybrid Computer Program for Predicting the |
| NEW HAMPSHIRE UNIV., DURHAM. WATER RESOURCES RESEARCH CENTER. | sembly and Display System, W73-02358 7C | Chemical Quality of Irrigation Return Flows, W73-02177 5B |
| The Influence of the New England Wetland on | NORTH CAROLINA UNIV., CHAPEL HILL. | OKLAHOMA STATE UNIV., STILLWATER. |
| Water Quantity and Quality, W73-02116 2D | DEPT. OF ENVIRONMENTAL SCIENCES AND | DEPT. OF AGRICULTURAL ENGINEERING. Reuse of Surface Runoff from Furrow Irriga- |
| NEW MEXICO AGRICULTURAL | ENGINEERING. Regional Management of Water Supply and | tion. |
| EXPERIMENT STATION, UNIVERSITY PARK. | Wastewater Disposal Facilities, | W73-02118 3F |
| Inventory of Water Diversions and Rate Struc- | W73-02354 6B | OKLAHOMA UNIV., NORMAN. |
| tures for Cities, Towns, and Villages in New | A Survey of the Benthic Macroinvertebrate | Bibliography of Remote Sensing for Planning |
| Mexico, W73-01963 6C | Populations in the New Hope and Lower Haw | and Administrative Studies, W73-02305 7B |
| VEW LUPING COLUMN THUS THUS THE | Rivers, W73-02355 SB | |
| NEW MEXICO STATE UNIV., UNIVERSITY PARK, DEPT. OF AGRONOMY. | | ONTARIO WATER RESOURCES |
| Soil Associations and Land Classification for | Heavy Metal Analyses of Freshwater Macroin- | COMMISSION, TORONTO. DIV. OF WATER RESOURCES. |
| Irrigation, Socorro County, | vertebrates from the Lower Haw and New | Hydrogeology of the Forty Mile Creek |
| W73-02117 3F | Hope Rivers, W73-02356 5A | Drainage Basin on the South Shore of Lake |
| NEW SOUTH WALES UNIV., KENSINGTON | NORTH CAROLINA WATER RESOURCES | Ontario, W73-02503 2H |
| (AUSTRALIA); AND DAMES AND MOORE, | RESEARCH INST., RALEIGH. | W 73-02303 |
| SYDNEY (AUSTRALIA). | The Effects of Sewer Surcharges on the Level | OREGON STATE UNIV., CORVALLIS. DEPT. |
| A Theoretical Study of the Pressures Acting on a Rigid Wall by a Sloping Earth or Rock Fill, | of Industrial Wastes and the Use of Water by | OF CIVIL ENGINEERING. Mathematical Modeling of Estuarine Benthal |
| W73-02077 8D | Industry, W73-02115 5G | Systems, |
| | W/3-02115 | W73-02457 5C |
| NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, | NORTH DAKOTA STATE UNIV., FARGO. | OREGON STATE UNIV., CORVALLIS. DEPT. |
| ALBANY, WATER QUALITY SURVEILLANCE | The Forest Overstory Vegetation on the Mis- souri River Floodplain in North Dakota, | OF GEOGRAPHY. |
| SECTION. | W73-02185 4A | The Problems and Issues of Implementing Na- |
| Monitoring New York's Water Automatically, W73-02135 | 100 | tional Water Legislation at Subnational Levels, W73-02242 6E |
| W 73-02133 | NORTHERN ARIZONA UNIV., FLAGSTAFF. An Experiment in Modeling Rocky Mountain | The same and the s |
| NEW YORK STATE NATURAL GAS CORP. | Forest Ecosystems, | OREGON STATE UNIV., CORVALLIS. DEPT. |
| The World's Deepest Cable Tool Well, | W73-02566 2A | OF OCEANOGRAPHY. Comparison of Benthic Infaunal Abundance on |
| W73-02388 8B | A STATE OF THE PARTY OF THE PAR | Two Abyssal Plains in the Northeast Pacific |
| NORTH CAROLINA BOARD OF WATER AND | NORTHWESTERN UNIV., EVANSTON, ILL. DEPT. OF GEOLOGICAL SCIENCES. | Ocean with Comments on Deep-Sea Food |
| AIR RESOURCES, RALEIGH. WATER AND | Field Mapping and Computer Simulation of | Sources, |
| AIR QUALITY CONTROL COMMITTEE. | Braided-Stream Networks, | W73-02017 SA |
| Proposed Reclassifications of Certain Waters in the Cape Fear, Lumber, and Yadkin-Pee Dee | W73-02490 2J | Techniques for Sampling Benthic Organisms, |
| River Basins to be Considered at a Public Hear- | NOTTINGHAM UNIV. (ENGLAND). DEPT. OF | W73-02019 7B |
| ing to be Held on November 2, 1972, in | GEOGRAPHY. | Historical Changes of Estuarine Topography |
| Southern Pines, North Carolina. | Feedback Relationships in Geomorphology, | With Question Of Future Management Policies, |
| W73-01983 5G | W73-02040 2J | W73-02464 SC |
| NORTH CAROLINA STATE UNIV., RALEIGH. | NUTALL (EDMUND) LTD. (ENGLAND); AND | OREGON STATE UNIV., CORVALLIS. |
| Drain and Irrigate with the Same System, | MOTT, HAY AND ANDERSON (ENGLAND). | ENGINEERING EXPERIMENT STATION. |
| W73-02353 3F | Mersey Kingsway Tunnel: Construction, | Proceedings 1971 Technical Conference on |
| User Charges as a Means for Pollution Control: | W73-02078 8A | Estuaries of the Pacific Northwest. |
| The Case of Sewer Surcharges, | OHIO DEPT. OF HEALTH LABS., COLUMBUS. | W73-02454 5C |
| W73-02359 5G | Effect of Lime-Treated Water Upon Survival | OREGON STATE UNIV., CORVALLIS. |
| | of Bacteria, | SCHOOL OF BUSINESS AND TECHNOLOGY. |
| NORTH CAROLINA STATE UNIV., RALEIGH. | W73-02148 5F | Objectives of Water Resource Management - |
| COLLEGE EDUCATION. | OHIO STATE UNIV., COLUMBUS, DEPT. OF | Can They Be Achieved Through Legislation, |
| Evaluation of Selected Aspects of Communica- | AGRICULTURAL ECONOMICS AND RURAL | W73-02561 6E |
| tion of Water Resources Research Information | SOCIOLOGY. | OREGON STATE UNIV., CORVALLIS. WATER |
| Among University Researchers and Users, | Cost of Public Water Service in Ohio, | RESOURCES RESEARCH INST. |
| W73-02357 6B | W73-02285 6C | Hills Creek Reservoir Turbidity Study, W73-02092 5C |
| NORTH CAROLINA STATE UNIV., RALEIGH. | OHIO STATE UNIV., COLUMBUS. DEPT. OF | W 13-02092 |
| DEPT OF ECONOMICS. | GEOLOGY. | OREGON STATE UNOV., CORVALLIS. |
| Sewer Surcharges and Their Effect on Water | Water Pollution by Oil-Field Brines and Re- | WATER RESOURCES RESEARCH INST. |
| Use, W73-02295 SG | lated Industrial Wastes in Ohio, W73-02192 5B | Laws for a Better Environment. W73-02560 6E |
| 117-92273 | H 13-V4176 | 11 13 VEJUU |

| PACIFIC NORTHWEST WATER LAB., | Estuaries, Bays and Coastal Currents Around Puerto Rico. | Possible Influence on the Composition of Sedi- ments in the Southern North Sea, |
|--|---|--|
| CORVALLIS, OREG. Applications of Some Numerical Models to | W73-01974 5B | W73-02155 23 |
| Pacific Northwest Estuaries, | W 13-01914 3B | W 13-02133 |
| W73-02456 5C | PURDUE UNIV., LAFAYETTE, IND. WATER | RUTGERS - THE STATE UNIV., NEW |
| | RESOURCES RESEARCH CENTER. | BRUNSWICK, N.J. |
| PEDIATRICHESKII MEDITSINSKII INSTITUT, | Economic Analyses of Optimal Water Quality | A Statistical Study of The Effects of Polyelec- |
| LENINGRAD (USSR). | Management, | trolytes, Mixing and pH Upon an Activated |
| Effect of Dietry Deficiency of Trace Elements | W73-01951 5G | Sludge System, |
| (Cu, Mo, Mn) on Water and Electrolyte Metabolism. | A Program for Estimating Runoff from Indiana | W73-02221 SD |
| W73-02086 5C | Watersheds, Part III Analysis of | Effects of Handling and Salinity on Oxyger |
| *************************************** | Geomorphologic Data and a Dynamic Con- | Requirements of the Striped Bass, Morone |
| PENNSYLVANIA STATE UNIV., UNIVERSITY | tributing Area Model for Runoff Estimation, | Saxatilis. |
| PARK. | W73-01952 2A | W73-02435 50 |
| Accumulations of Certain Pesticides in Adipose | PURDUE UNIV., WEST LAFAYETTE, IND. | Personal Company of the Company of t |
| Tissues and Performance of Angus, Hereford and Holstein Steers Fed Apple Processing | DEPT. OF AGRICULTURAL ECONOMICS. | Mathematical Description of Biological and |
| Wastes. | Watershed Project Evaluation Involving Multi- | Physical Processes in Heated Streams, |
| W73-02204 5C | ple Social Objectives, | W73-02468 50 |
| Charles Control of the Control of th | W73-02348 6B | RUTGERS - THE STATE UNIV., NEW |
| PETROLEUM RESEARCH CORP., DENVER, | REACTOR CENTRUM NEDERLAND, PETTEN. | BRUNSWICK, N.J. DEPT. OF CHEMICAL AND |
| COLO. | | BIOCHEMICAL ENGINEERING. |
| Special Application of Drill-Stem Test Pressure Data. | Determination of Manganese, Copper, and Iron in Human Blood by Neutron Activation Analy- | Nonlinear Optimal Control Theory Applied to |
| W73-02383 8G | sis, | Distributed Feed Biochemical River Reactor |
| #13-023-0 | W73-02018 5A | with Dual Water Quality and Self Purification |
| PHILADELPHIA WATER DEPT., PA. | | Restrainta, |
| Manager's Role in the Decision Making | READING UNIV. (ENGLAND). DEPT. OF | W73-02352 50 |
| Process, | MATHEMATICS. | AND COME OF A PRINCIPLE WITH |
| W73-02127 6B | Effect of Friction on Wave Shoaling, W73-02173 2E | RUTGERS - THE STATE UNIV., NEW |
| PHILLIPS PETROLEUM CO., HOUSTON, TEX. | W/3-021/3 | BRUNSWICK, N.J. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING. |
| Volume Requirements for Air or Gas Drilling, | RESOURCES FOR THE FUTURE, INC., | Separation of Lignin from Aqueous Solution by |
| W73-02381 8B | WASHINGTON, D.C. | Adsorptive Bubble Separation Processes, |
| | Closing the Gap in Waste Management, | W73-02350 51 |
| PITTSBURGH UNIV., PA. GRADUATE SCHOOL OF PUBLIC HEALTH. | W73-02215 5D | |
| Effect of Lime Neutralized Iron Hydroxide | RHODE ISLAND UNIV., KINGSTON. | RUTGERS - THE STATE UNIV., NEW |
| Suspensions on Juvenile Brook Trout (Sal- | Transfer of Pesticides Through Water, Sedi- | BRUNSWICK, N.J. WATER RESOURCES |
| velinus Fontinalis, Mitchill), | ments and Aquatic Life, | RESEARCH INST. |
| W73-02277 5C | W73-01959 5B | Analysis of Thermal Pollution Dispersion, |
| | W | W73-01962 51 |
| PITTSBURGH UNIV., PA. PYMATUNING LAB. | Kinetics of Bacterial Growth During Aerobic Oxidation of Organics, | SASKATCHEWAN-NELSON BASIN BOARD, |
| OF ECOLOGY. The Contribution of Leptodora and Other | W73-02449 5C | REGINA. |
| Zooplankton to the Diet of Various Fish, | W 13-02-143 | Preliminary Analysis of Surface Water Avails |
| W73-02031 5C | RHODE ISLAND UNIV., KINGSTON. DEPT. OF | bility, |
| | ANIMAL PATHOLOGY. | W73-02544 4 |
| POLISH ACADEMY OF SCIENCES, KRAKOW. | Significance of the Fecal Streptococci, | |
| ZAKLAD BIOLOGII WOD. The German Carp (Carassius auratus gibelio | Coliform Bacteria and Coliphage in Relation- ship to Enteric Virus Pollution in Sewage and | SASKATCHEWAN RESEARCH COUNCIL, |
| Bloch) from the Ilownica River Stocked in a | Rivers. | SASKATOON. Computing Salinity Profiles in Ice, |
| Carp Pond, | W73-02119 5B | |
| W73-02026 8I | | W73-02054 2 |
| GRANT TO THE MARKET PROPERTY OF THE PROPERTY OF | RHODE ISLAND UNIV., KINGSTON. | SAVANNAH RIVER ECOLOGY LAB., AIKEN, |
| Dace (Leuciscus Leuciscus L.) from the Upper | GRADUATE SCHOOL OF OCEANOGRAPHY. | s.c. |
| Vistula and Czarna Przemsza, W73-02090 2I | Chemical Responses by Marine Organisms to Stress, Stress in Hard Clams from a Polluted | Standing Crops of Elements and Atomic Ratio |
| W 13-02090 | Estuary, | in a Small Mammal Community, |
| PSZCZYNA, POL. POLISH ACADEMY OF | W73-01975 5C | W73-02584 5 |
| SCIENCES, PSZCZYNA. HYDROBIOLOGICAL | | |
| STATION. | Edge Waves with Current Shear, | SCHLUMBERGER WELL SURVEYING CORP. |
| Overgrowing of the Dam Reservoir at Goczal- | W73-02170 2E | RIDGEFIELD, CONN. The Sidewall Epithermal Neutron Porosit |
| kowice in the Years 1967-1969, W73-02088 2H | ROAD RESEARCH LAB., CRAWTHORNE | Log, |
| W 73-02000 | (ENGLAND). | W73-02396 8 |
| PUERTO RICO UNIV., MAYAGUEZ. DEPT. OF | Representative Rural Catchments in Kenya and | |
| MARINE SCIENCES. | Uganda, | SELIO UNIV., TOKYO (JAPAN). BIOLOGICAL |
| The Adhesive Properties of Chlorella Vulgaris, | W73-02050 2A | LAB. |
| and the Enhancement of This Adhesion by Substances Found in Ambient Sea Water, | ROME UNIV. (ITALY). INSTITUTO DI | Algal Nitrogen Fixation in the Tropics, |
| W73-02470 5C | CLINICA ODONTOIATRICA. | W73-02473 |
| 30 | Alternatives for Fluoridation of Aqueducts (In | CONTRA MACHINETON D.C. |
| PUERTO RICO UNIV., MAYAGUEZ. WATER | Italian), | SENATE, WASHINGTON, D.C. |
| RESOURCES RESEARCH INST. | W73-02160 5G | Prompt Passage of Ocean Dumping Bill |
| Determination of the Rate of Biodegradation in | ROYAL NETHERLANDS METEOROLOGICAL | Urged, |
| Some Polluted Tropical Waters and in Some | ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT, | W73-02255 |
| Types of Liquid Wastes Common in Puerto Rico, | The Frequency Distribution of the Current | The Need to Control Ocean Dumping, |
| W73-01973 5B | Speed at the Netherlands Lightvessels and Its | W73-02526 |
| | | |

Storm Ukrain dozhde Molda W73-0

Investi Storm livnev Annua ester l rek ba W73-0

Study izuche W73-0 Relati Durati Carpa ustano

vysoto pat), W73-0 UNIVE MINN. Water UNIVE DEPT. ENGIN Wast Anion Phosp W73-UNIVE DEPT. Sedin tivity W73-UPPSA PHYSI

> Dela W73 UPPSA Alga W73 UTAH A M Wat W73 UTAH Furt Des Firm W73 Wat

SEVERN RIVER AUTHORITY (ENGLAND).

| SEVERN RIVER AUTHORITY (ENGLAND). The Ministry's Memorandum on 'Standards of Effluents to Rivers With Particular Reference | STATE UNIV., COLL., BUFFALO, N.Y. GREAT LAKES LAB. Annotated Bibliography of Lake Ontario Lim- | TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF OCEANOGRAPHY. Diffusivity of Suspended Matter in the Carib- bean Sea. |
|--|--|---|
| to Industrial Effluents': A Review, W73-02228 5G | nological and Related Studies. I Chemistry, W73-02443 5C | W73-02171 2J |
| SHELL DEVELOPMENT CO., HOUSTON, TEX. | STATE UNIV. OF NEW YORK, ALBANY. | TEXAS UNIV., AUSTIN. DEPT. OF CHEMICAL |
| EXPLORATION AND PRODUCTION | Transport in the Baroclinic Coastal Current | ENGINEERING. |
| RESEARCH DIV. | Near the South Shore of Lake Ontario in Early | Modeling and Sensitivity Analysis for Planning Decisions in Water Resources Expansion, |
| The Use of Acoustic Logs in the Evaluation of Sandstone Reservoirs, | Summer, | W73-02541 4A |
| W73-02401 8G | W73-02510 2H | |
| OUTDOWN TINEY MATERIAGES (TABLES | STEEL CO. OF CANADA LTD., HAMILTON | TEXAS UNIV., AUSTIN. DEPT. OF CIVIL ENGINEERING. |
| SHINSHU UNIV., MATSUMOTO (JAPAN). Note on the Swimming Behavior of | (ONTARIO). UTILITIES DEPT. | Hypolimnion Aeration, |
| Chironomus Plumosus Larvae in Lake Suwa, | Regeneration of Steelworks Hydrochloric Acid Pickle Liquor. | W73-02137 5F |
| (In Japanese), | W73-02198 5D | TEXAS UNIV., EL PASO, DEPT. OF |
| W73-02586 2H | STOCKHOLM UNIV. (SWEDEN). DEPT. OF | GEOLOGICAL SCIENCES. |
| SKIDAWAY INST. OF OCEANOGRAPHY, | PHYSICAL GEOGRAPHY. | Wisconsin Boulder Flow and Its Geomorphic |
| SAVANNAH, GA. | Ice-Cored Moraines in Southern British Colum- | Implications, Franklin Mountains, El Paso County, Texas, |
| Interactions of Feeding Rates and Environmen- tal Temperature on Growth, Food Conversion, | bia and Alberta, Canada, | W73-02487 2J |
| and Body Composition of Channel Catfish, | W73-02042 2C | Re-evaluation of the Relationship of Master |
| W73-02572 8I | STONE (RALPH) AND CO., INC., LOS | Streams and Drainage Basins, |
| SMITH (ROBERT C.) AND ASSOCIATES, | ANGELES, CALIF. | W73-02488 2J |
| COLUMBUS, OHIO. | Water and Sewage Sludge Absorption by Solid | THOMPSON AND TUGGLE, MONTGOMERY, |
| Relation of Screen Design to the Design of | Waste, W73-02191 5D | ALA. |
| Mechanically Efficient Wells, W73-02410 8B | | Magnesium Carbonate: A Recycled Coagulant - |
| THE PROPERTY AND ADDRESS OF THE PARTY OF THE | SUNDERLAND AND SOUTH SHIELDS WATER CO. (ONTARIO). | II, W73-02145 5F |
| SNOWY MOUNTAINS ENGINEERING CORP., | Practical Experience in the use of Polyelec- | |
| COOMA (AUSTRALIA). Hydrologic Effects of a Bushfire in a | trolytes, | What's So Great About MgCO3, |
| Catchment in Southeastern New South Wales, | W73-02203 5D | W73-02219 5F |
| W73-02589 4C | SVERDRUP, PARCEL AND ASSOCIATES, INC., | TOHOKU UNIV., SENDAI (JAPAN). FACULTY |
| SOIL CONSERVATION SERVICE. | ST. LOUIS, MO. | OF AGRICULTURE. The Development of Rice Grains Under Con- |
| WASHINGTON, D.C. | Microbial Degradation of Pesticides in Aqueous | trolled Environment: II. The Effects of Tem- |
| Eagle-Tumbleweed Draw Watershed, New | Solutions, W73-02534 5B | perature Combined With Air-Humidity and |
| Mexico (Draft Environmental Impact State- ment). | | Light Intensity During Ripening on Grain Development, |
| W73-01985 4D | SYDNEY UNIV. (AUSTRALIA). | W73-02001 3F |
| Sediment Control. | Rate of Settlement Under Two- and Three- Dimensional Conditions, | TO PRO WATER BRU ONIO |
| W73-02200 5G | W73-02075 8D | TOLEDO WATER DIV., OHIO. Information on the Velocity and Flow Pattern |
| Boxelder Creek Watershed Project, Colorado | TAHAL CONSULTING ENGINEERS LTD., TEL | of Detroit River Water in Western Lake Erie |
| and Wyoming (Final Environmental Impact | AVIV (ISRAEL). | Revealed by an Accidental Salt Spill, W73-02057 5B |
| Statement). | The Development of Israel's Water Resources, | W 73-02037 |
| W73-02235 4D | W73-02292 6B | U.S. GYPSUM CO., GALENA PARK, TEX. |
| Sunrise Subwatershed, Little Sioux Flood | TECHNION - ISRAEL INST. OF TECH., HAIFA. | The Eyes of Texas Are on U.S. Gypsum, W73-02226 5D |
| Prevention Project, Iowa (Draft Environmental | DEPT. OF CIVIL ENGINEERING. | A sensitive control of the Color |
| Impact Statement). W73-02263 4D | Optimizing the Operation of Israel's Water | UKRAINIAN RESEARCH INST. OF THE FISH INDUSTRY, KIEV (USSR). |
| | System, W73-02287 6B | Pike Rations in the Kremenchung Reservoir (In |
| SOUTHERN ILLINOIS UNIV., CARBONDALE. | | Russian), |
| Alternative Adjustments to Natural Hazards, W73-02367 6F | TECHNISCHE HOCHSCHULE, MUNICH (WEST GERMANY) INSTITUT FUER | W73-02596 2H |
| | ANGEWANDTE BOTANIK. | UKRAINSKII NAUCHNO-ISSLEDOVATELSKII |
| SPRINGFIELD COLL., MASS. Surface Waters of a Small City (Springfield, | Eco-Physiocloical Studies on Desert Plants: V. | GIDRO-METEOROLOGICHESKII INSTITUT, |
| Mass), | Influence of Soaking and Redrying on the Ger- | KIEV (USSR), Hydrologic Investigations and Flow Computa- |
| W73-01961 6G | mination of Zygophyllum Coccineum Seeds and the Possible Contribution of an Inhibitor to | tions (Gidrologicheskiye issledovaniya i |
| STANFORD UNIV., CALIF. | the Effect, | raschety stoka). |
| DDT Residues in Coastal Marine Phytoplank- | W73-02093 2I | W73-02330 4A |
| ton and Their Transfer in Pelagic Food Chains, | TENNESSEE TECHNOLOGICAL UNIV., | Runoff Coefficients for Areas Between |
| W73-02105 5C | COOKEVILLE. | Isochrones (O koeffitsiyentakh yestestvennogo zaregulirovaniya stoka na mezhizokhronnykh |
| STANFORD UNIV., CALIF. DEPT. OF CIVIL | Power Spectral Analysis of Water Temperature | uchastkakh), |
| ENGINEERING. | Fluctuations, W73-02180 5B | W73-02331 4A |
| Anion Exchange and Filtration Techniques for Wastewater Renovation, | W 13-04100 | Form of the Relation Between Melt-Water |
| W73-02537 5D | TENNESSEE UNIV., KNOXVILLE. CENTER | Losses and Some Hydrologic Characteristics |
| STANFORD UNIV., PALO ALTO, CALIF. | FOR BUSINESS AND ECONOMIC RESEARCH. The Effect of Water Resources on Industrial | (O vozmozhnoy forme zavisimosti poter' ta- lykh vod ot nekotorykh obuslovlivayushchikh |
| Water Desalting, Present and Future, | Growth in the Tennessee Valley Region, | faktorov), |
| W73-02131 3A | W73-02562 3E | W73-02332 2E |

| Storm Runoff Coefficients for Rivers of the | UTRECHT RIJKSUNIVERSITEIT | WASHINGTON UNIV., SEATTLE. |
|---|--|--|
| Ukraine and Moldavia (Koeffitsiyenty stoka dozhdevykh pavodkov na rekakh Ukrainy i | (NETHERLANDS). GEOLOGICAL INST. | Methodology in Establishing Water Quality |
| Moldavii), | Some Sedimentological Aspects of the Flu- vioglacial Outwash Plain Near Soesterberg | Standards, W73-02536 5G |
| W73-02333 4A | (The Netherlands), | W13-02330 |
| | W73-02159 2J | WASHINGTON UNIV., SEATTLE. COLL. OF |
| Investigation of the Rates and Traveltime of Storm Runoff in the Carpathians (K voprosu ob | | FISHERIES. |
| issledovanii skorostey i vremeni dobeganiya | UTRECHT RUKSUNIVERSITEIT | Induced Aggregation of Pond-Reared Rainbow |
| livnevykh vod v Karpatakh), | (NETHERLANDS). SEDIMENTOLOGY DIV. Tidal Deposits and Their Sedimentary Struc- | Trout (Salmo gairdneri) Through Acoustic Con- ditioning. |
| W73-02334 4A | tures. | W73-02576 8I |
| Annual Streamflow Fluctuations in the Dni- | W73-02154 2L | |
| ester River Basin (Kolebaniya godovogo stoka | | WASHINGTON UNIV., SEATTLE. DEPT. OF |
| rek basseyna Dnestra), | VANDERBILT UNIV., NASHVILLE, TENN. | AERONAUTICS AND ASTRONAUTICS. Model of Pressure Ridge Formation in Sea Ice, |
| W73-02335 4A | Resistance of Carcinogenic Organic Com- pounds to Oxidation by Activated Sludge, | W73-02172 2C |
| Study of the Thermal Regime of Rivers (Ob | W73-02535 5D | |
| izuchenii termicheskogo rezhima rek), | | WASHINGTON UNIV., SEATTLE. DEPT OF |
| W73-02336 4A | VIRGINIA COMMONWEALTH UNIV., | CIVIL ENGINEERING. Hydro-Ecological Problems of Marinas in |
| Relation of Ice Freezeup Dates and Ice-Cover | RICHMOND. Investigations on Nutrient Factors Limiting | Puget Sound, |
| Duration to Elevation and Channel Slopes of | Phytoplankton Productivity in Two Central Vir- | W73-02462 5C |
| Carpathian Rivers (O svyazi srokov | ginia Ponds, | |
| ustanovleniya i prodoizhitel'nosti ledostava s | W73-02452 5C | WASHINGTON UNIV., SEATTLE. DIV. OF |
| vysotoy mestnosti i uklonami na rekakh Kar- pat), | VIRGINIA POLYTECHNIC INST. AND STATE | MARINE RESOURCES. Environmental Management for Puget Sound: |
| W73-02337 4A | UNIV. BLACKSBURG. | Certain Problems of Political Organization and |
| | The Structure and Function of Fresh-Water | Alternative Approaches, |
| UNIVERSAL OIL PRODUCTS, ST. PAUL, MINN. JOHNSON DIV. | Microbial Communities. | W73-02251 6E |
| Maintaining Water Well Yield, | W73-02095 5C | WATER POLLUTION RESEARCH LAB., |
| W73-02369 8G | VIRGINIA POLYTECHNIC INST. AND STATE | STEVENAGE (ENGLAND). |
| Water Well Hydraulics, | UNIV., BLACKSBURG. DEPT. OF AEROSPACE | A Method for Isolating Suspended Solids from |
| W73-02370 8B | AND OCEAN ENGINEERING. | Sewage Effluents for Measurement of Oxygen |
| | Density Stratified, Viscous Flow Past a Flat | Demand, W73-02207 5D |
| UNIVERSITY COLL., LONDON (ENGLAND). | Plate, W73-02563 8B | W 13-02201 |
| DEPT. OF CIVIL AND MUNICIPAL ENGINEERING. | W /3-02363 | Fisheries, Cooling-Water Discharges and |
| Wastewater Treatment by Ion Exchange, | VIRGINIA POLYTECHNIC INST. AND STATE | Sewage and Industrial Wastes, |
| W73-02202 5D | UNIV., BLACKSBURG. DEPT. OF CIVIL | W73-02433 5C |
| Anion Exchange Equilibria Involving | ENGINEERING. Mechanisms of Change in Activated Sludge De- | Prevention of Pollution From the Industrial |
| Phosphate, Sulphate and Chloride, | waterability During Aerobic Digestion, | Use of Oil, |
| W73-02208 5D | W73-02362 5D | W73-02434 5D |
| UNIVERSITY COLL. OF SWANSEA (WALES). | VIRGINIA BOLVEROINIO INCELANDOTATE | WATER RESOURCES COUNCIL, |
| DEPT. OF GEOLOGY. | VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. WATER RESOURCES | WASHINGTON, D. C. |
| Sedimentary Evidence of Bottom Current Ac- | RESEARCH CENTER. | Revision of Completed Regional or River Basin |
| tivity, Strait of Gibraltar Region, W73-02496 | Treatment of Waste Sludges from Water Purifi- | Plans, A Policy Statement. W73-01992 6B |
| W73-02496 2J | cation Plants, | W 73-01992 |
| UPPSALA UNIV. (SWEDEN). DEPT. OF | W73-01964 5F | Proposed Principles and Standards for Planning |
| PHYSICAL GEOGRAPHY. | VIRGINIA POLYTECHNIC INST. AND STATE | Water and Related Land Resources. |
| Bedforms of the Tana River, Norway, W73-02047 2C | UNIV., BLACKSBURG. WATER RESOURCES | W73-02231 6E |
| | RESEARCHCENTER. | Report to the Water Resources Council by the |
| Delay of Runoff from a Glacier Basin, | An Ecosystematic Study of the South River, | Special Task Force, Findings and Recommen- |
| W73-02048 2C | Virginia, W73-01972 5C | dations. |
| UPPSALA UNIV. (SWEDEN). INST. OF | | W73-02232 6E |
| PHYSIOLOGICAL BOTANY. | VYSKUMNY USTAV RASTLINNEJ VYROBY, | Procedures for Evaluation of Water and Re- |
| Algal Nitrogen Fixation in Temperate Regions, W73-02471 5C | PIESTANY. | lated Land Resource Projects. |
| W73-02471 5C | Changes of Soil Moisture Under Lucerne and Maize Stands Grown for Green Mass (In | W73-02271 6G |
| UTAH STATE UNIV., LOGAN. COLL. OF | Czech). | Great Lakes Basin Commission Challenges for |
| ENGINEERING. | W73-02142 2G | the Future. An Interim Report on the Great |
| A Mixed Integer Programming Approach to Planning Multiple Water Sources for Municipal | UVSVIIMU HOTAU BAOM INNET UURANU | Lakes Basin Framework Study. |
| Water Supply, | VYZKUMNY USTAV RASTLINNEJ VYROBY, PIESTANY (CZECHOSLOVAKIA). | W73-02291 6B |
| W73-02540 6A | Frosthardiness of Apple Trees Scored Accord- | WATERLOO UNIV., (ONTARIO). DEPT. OF |
| UTAH WATER RESEARCH LAB., LOGAN. | ing to the Water Retention Ability of Leaves | CHEMICAL ENGINEERING. |
| Further Studies of Optimum Operation of | (In Czechoslovakian), | Simulation of the Mean Performance of Mu- |
| Desalting Plants as a Supplemental Source of | W73-02164 2D | nicipal Waste Treatment Plants, W73-02212 5D |
| Firm Yield, | WASHINGTON STATE UNIV., PULLMAN. | W 13-02212 3D |
| W73-02082 3A | Effects of Acute Gamma Radiation and Tem- | WATERLOO UNIV. (ONTARIO). DEPT. OF |
| Water Quality of Hyrum Lake and Its Relation- | perature on Growth and Survival of Juvenile | CIVIL ENGINEERING. |
| ship to Algal Blooms, | Rainbow Trout (Salmo Gairdneri), W73-02102 5C | New Evidence for Spencer's Laurentian River, W73-02505 2H |
| W73-02121 5C | W73-02102 5C | 11 /3-02303 2H |

WATERLOO UNIV. (ONTARIO). DEPT. OF MECHANICAL

| WATERLOO UNIV. (ONTARIO). DEPT. OF | WISCONSIN UNIV., MADISON. WATER | |
|--|---|--|
| MECHANICAL ENGINEERING. | RESOURCES CENTER. | |
| Experimental Investigation of the Spatial Form | Applications of Agglomerate Testing to Problems in Water Resources Management, | |
| of Large Internal Waves in a Near-Shore Re- | W73-01965 SF | |
| gion of Lake Huron, W73-02506 2H | W75-01905 | |
| W /3-02306 2H | WOODS HOLE OCEANOGRAPHIC | |
| WATKINS (G. REYNOLDS) CONSULTING | INSTITUTION, MASS. | |
| ENGINEERS, INC., LEXINGTON, KY. | The West Falmouth Oil Spill. I. Biology, | |
| SPECIAL PROJECTS. | W73-02023 5C | |
| Industrial Waste and the Small City. | | |
| W73-02214 5D | The West Falmouth Oil Spill. Data Available in | |
| | 1971. II. Chemistry, W73-02024 5C | |
| WESTRONICS, INC., FORT WORTH, TEX. | W 73-02024 | |
| The Delta-Log, a Differential Temperature Sur- | A Fracture Criterion for Brittle Anisotropic | The state of the s |
| veying Method, | Rock, | |
| W73-02380 8G | W73-02397 8E | |
| WINDOOD UNITY (ONTARIO) BERT OF CIVIL | WROCK AW TIME (BOT AND THOSE OF | |
| WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL | WROCLAW UNIV. (POLAND). INST. OF | |
| ENGINEERING. Sedimentation Characteristics of Gorge-Type | GEOGRAPHY. The Origin of Fluted Moraine at the Fronts of | |
| The state of the s | Contemporary Glaciers, | |
| Reservoirs, W73-02179 2J | W73-02045 2J | |
| W 73-02179 23 | 117-020-5 | |
| WISCONSIN DEPT. OF NATURAL | WUERZBURG UNIV. (WEST GERMANY). | |
| RESOURCES, MADISON. | BOTANISCHES INSTITUT II. | |
| Aquatic Insects of the Pine-Popple River, | The Functional Adaptation of Lichens to | |
| Wisconsin. | Ecological Conditions of Arid Areas, | |
| W73-02097 5C | W73-02193 2I | |
| | WYZSZA SZKOLA ROLNICZA, SZCZECIN | |
| WISCONSIN DEPT. OF NATURAL | (POLAND). | and the second process |
| RESOURCES, MADISON. FLOOD PLAIN AND | The Effect of Ecological Conditions on the | |
| SHORELAND MANAGEMENT SECTION. | Parasite Fauna of Perch Perca Fluviatilis L. In | |
| Management Problems in Flood Plain Areas, | Lake Dargin, | |
| W73-02288 6F | W73-02500 SC | |
| WICCONGIN UNIV. MADICON | | |
| WISCONSIN UNIV., MADISON. | | |
| Phosphorus Removal in Trickling Filters, | | |
| W73-02220 5D | | |
| WISCONSIN UNIV., MADISON. DEPT. OF | | |
| BOTANY. | | |
| Multivariate Approaches to Algal Strategies | | |
| and Tactics in the Systems Analysis of | | |
| Phytoplankton, | | |
| W73-02469 5C | | |
| | | |
| WISCONSIN UNIV., MADISON. DEPT. OF | | |
| CIVIL AND ENVIRONMENTAL | | |
| ENGINEERING. | | |
| An Appraisal of the PCB Situation in the State | | |
| of Wisconsin, W73-02447 5C | | |
| W 13-02441 3C | | |
| Ways in Which a Resident of the Madison | | |
| Lakes' Watershed may Help to Improve Water | | |
| Quality in the Lakes, | | |
| W73-02479 5C | | |
| | | |
| WISCONSIN UNIV., MADISON. DEPT. OF | | |
| CIVIL ENGINEERING. | | |
| Evaluating Economy of Scale, W73-02542 5D | | |
| W 73-02342 3D | | The second secon |
| WISCONSIN UNIV., MADISON. WATER | | |
| CHEMISTRY LAB. | | |
| Chlorobiphenyls (PCBs) in the Milwaukee | | |
| River, | | |
| W73-02084 5C | | |
| | | |
| WISCONSIN UNIV., MADISON. WATER | | |
| CHEMISTRY PROGRAM. | | |
| Chemical Aspects of Bioassay Techniques for | | |
| Establishing Water Quality Criteria, | | To Treat |
| W73-02446 5A | | |
| Bala of Phosphoma is Potential and Diff | | X |
| Role of Phosphorus in Eutrophication and Dif- | | |
| fuse Source Control, W73-02478 5C | | |
| TT 13-02410 3C | | |

W73-01951 W73-01952 W73-01953 W73-01954 W73-01955 W73-01956 W73-01957 W73-0195 W73-01959 W73-0196 W73-0197 W73-0198 W73-0198 W73-0198 W73-0198 W73-019 W73-020 W73-020 W73-020 W73-020 W73-020 W73-026 W73-02 W73-026 W73-026 W73-02 W73-02

W73-02 W73-02 W73-02 W73-02 W73-02

ACCESSION NUMBER INDEX

| W73-01951 | 5G | W73-02029 | 5C | W73-02107 | 5B | W73-02185 4A |
|------------------------|-----|-----------|-----|------------------------|------|--------------|
| | | W73-02030 | | | | W73-02186 8B |
| W73-01952 | 801 | | | | | W73-02187 5G |
| W73-01953 | 5B | W73-02031 | 5C | | 8B | |
| W73-01954 | 5C | W73-02032 | 5B | | 8B | W73-02188 5D |
| W73-01955 | 2F | W73-02033 | 4B | | 5B | W73-02189 2I |
| W73-01956 | 4B | W73-02034 | 7C | | 5A | W73-02190 5D |
| W73-01957 | 5B | W73-02035 | 2J | | 5B | W73-02191 5D |
| W73-01958 | 5A | W73-02036 | 7A | W73-02114 | 5A | W73-02192 5B |
| W73-01959 | 5B | W73-02037 | 2L | W73-02115 | 5G | W73-02193 2I |
| W73-01960 | 5B | W73-02038 | 2K | W73-02116 | 2D | W73-02194 5A |
| W73-01961 | 6G | W73-02039 | 2K | W73-02117 | 3F | W73-02195 2D |
| | | W73-02040 | | W73-02118 | 3F | W73-02196 5D |
| W73-01962 | | | | W73-02119 | | W73-02197 5D |
| W73-01963 | 6C | W73-02041 | 8D | | 5B | |
| W73-01964 | 5F | W73-02042 | 2C | W73-02120 | 5G | W73-02198 5D |
| W73-01965 | 5F | W73-02043 | 2C | W73-02121 | 5C | W73-02199 4A |
| W73-01966 | 3F | W73-02044 | 4B | W73-02122 | 5G | W73-02200 5G |
| W73-01967 | 3F | W73-02045 | 2.1 | W73-02123 | 3F | W73-02201 4A |
| W73-01968 | 3F | W73-02046 | 2C | W73-02124 | 5C | W73-02202 5D |
| W73-01969 | 3F | W73-02047 | 2C | W73-02125 | 5G | W73-02203 5D |
| W73-01970 | 6A | W73-02048 | 2C | W73-02126 | 6B | W73-02204 5C |
| W73-01971 | 5G | W73-02049 | 7C | W73-02127 | 6B | W73-02205 5D |
| W73-01972 | 5C | W73-02050 | 2A | W73-02128 | 2J | W73-02206 5D |
| | | W73-02051 | | W73-02129 | | W73-02207 5D |
| W73-01973 | | | | | | |
| W73-01974 | 5B | W73-02052 | 2L | W73-02130 | 5G | W73-02208 5D |
| W73-01975 | 5C | W73-02053 | 2K | W73-02131 | 3A | W73-02209 5F |
| W73-01976 | 5C | W73-02054 | 2C | W73-02132 | 5G | W73-02210 5D |
| W73-01977 | 5A | W73-02055 | 21 | W73-02133 | 21 | W73-02211 5D |
| W73-01978 | 5G | W73-02056 | 4A | W73-02134 | 3F | W73-02212 5D |
| W73-01979 | 6E | W73-02057 | 5B | W73-02135 | 5G | W73-02213 5D |
| W73-01980 | 5D | W73-02058 | 2F | W73-02136 | 6D | W73-02214 5D |
| W73-01981 | 4A | W73-02059 | 2F | W73-02137 | 5F | W73-02215 5D |
| W73-01982 | 5B | W73-02060 | 2C | W73-02138 | 5G | W73-02216 8C |
| | | | | W73-02139 | | W73-02217 2I |
| W73-01983 | 5G | W73-02061 | 4A | | | |
| W73-01984 | 8A | W73-02062 | 2J | W73-02140 | 2G | W73-02218 5C |
| W73-01985 | 4D | W73-02063 | 2C | W73-02141 | 3C | W73-02219 5F |
| W73-01986 | 8A | W73-02064 | 10A | W73-02142 | 2G | W73-02220 5D |
| W73-01987 | 8A | W73-02065 | 2A | W73-02143 | 5B | W73-02221 5D |
| W73-01988 | 8D | W73-02066 | 2J | W73-02144 | 5G , | W73-02222 5D |
| W73-01989 | 8D | W73-02067 | 8A | W73-02145 | 5F | W73-02223 5D |
| W73-01990 | 8A | W73-02068 | 2H | W73-02146 | 5F | W73-02224 5D |
| W73-01991 | 8A | W73-02069 | 8I | W73-02147 | 5A | W73-02225 5D |
| W73-01992 | 6B | W73-02070 | 8A | W73-02148 | 5F | W73-02226 5D |
| | | W73-02070 | | W73-02149 | | W73-02227 5D |
| W73-01993 | 6E | | | | | W73-02228 5G |
| W73-01994 | 8A | W73-02072 | 8D | W73-02150 | 5A | |
| W73-01995 | 8A | W73-02073 | 8A | W73-02151 | 5C | W73-02229 5D |
| W73-01996 | 3D | W73-02074 | 8C | W73-02152 | 7C | W73-02230 8A |
| W73-01997 | 3F | W73-02075 | 8D | W73-02153 | 2J | W73-02231 6E |
| W73-01998 | 21 | W73-02076 | 8A | W73-02154 | 2L | W73-02232 6E |
| W73-01999 | 3F | W73-02077 | 8D | W73-02155 | 2J | W73-02233 4A |
| W73-02000 | 21 | W73-02078 | 8A | W73-02156 | 2J | W73-02234 8A |
| W73-02001 | 3F | W73-02079 | 8F | W73-02157 | 2J | W73-02235 4D |
| W73-02002 | 5C | W73-02080 | 8A | W73-02158 | 5B | W73-02236 6E |
| | | W73-02081 | 5E | W73-02159 | 2J | W73-02237 6E |
| W73-02003 | | | | W73-02160 | 5G | W73-02238 6E |
| W73-02004 | 3F | W73-02082 | | W73-02161 | 5G | W73-02239 6E |
| W73-02005 | 3F | W73-02083 | 344 | W73-02161 W73-02162 | 5A | W73-02240 6E |
| W73-02006 | 3F | W73-02084 | 5C | | | W73-02240 6E |
| W73-02007 | 3F | W73-02085 | 5F | W73-02163 | 21 | |
| W73-02008 | 3F | W73-02086 | 5C | W73-02164 | 2D | W73-02242 6E |
| W73-02009 | 3F | W73-02087 | 21 | W73-02165 | 5B | W73-02243 6E |
| W73-02010 | 4A | W73-02088 | 2H | W73-02166 | 5A | W73-02244 6E |
| W73-02011 | 21 | W73-02089 | 5F | W73-02167 | 5A | W73-02245 6E |
| W73-02012 | 5A | W73-02090 | 21 | W73-02168 | 2C | W73-02246 6E |
| W73-02013 | 3F | W73-02091 | 5F | W73-02169 | 4A | W73-02247 6E |
| W73-02014 | 1B | W73-02092 | 5C | W73-02170 | 2E | W73-02248 6E |
| W73-02015 | 5A | W73-02093 | 21 | W73-02171 | 2J | W73-02249 2I |
| W73-02016 | 5C | W73-02094 | 2L | W73-02172 | 2C | W73-02250 6E |
| W73-02016 W73-02017 | | W73-02095 | 5C | W73-02173 | 2E | W73-02251 6E |
| | 5A | | | | 2A | W73-02252 6E |
| W73-02018 | 5A | W73-02096 | 5A | | | W73-02253 8D |
| W73-02019 | 7B | W73-02097 | 5C | W73-02175 W73-02176 | | W73-02254 8D |
| W73-02020 | 5C | W73-02098 | 5B | | 2E | W73-02255 6E |
| W73-02021 | 5C | W73-02099 | 5C | W73-02177 | 5B | |
| W73-02022 | 5B | W73-02100 | 5C | W73-02178 | 5B | W73-02256 6E |
| W73-02023 | 5C | W73-02101 | 5C | W73-02179 | 2J | W73-02257 6E |
| W73-02024 | 5C | W73-02102 | 5C | W73-02180 | 5B | W73-02258 6E |
| W73-02025 | 3F | W73-02103 | 5C | W73-02181 | 5B | W73-02259 6G |
| W73-02026 | 81 | W73-02104 | 2H | W73-02182 | 5A | W73-02260 6E |
| W73-02027 | 5A | W73-02105 | 5C | W73-02183 | 5A | W73-02261 8A |
| W73-02028 | | W73-02105 | 5B | W73-02184 | 3F | W73-02262 4A |
| 11.5 02020 | | | | | | |
| | | | | | | |

11/22 00245 OT

W73-02

W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02 W73-02

11272 00/04 :0TT

W73-02263

| W73-02263 | 4D | W73-02342 | 2J | W73-02422 | 8B | | W73-02501 | 2H |
|-----------|-----|-----------|------|-----------|-----|--------|------------|----|
| W73-02264 | 4A | W73-02343 | 5A | W73-02423 | 4B | | W73-02502 | 2H |
| | | | | | | | | |
| W73-02265 | 8D | W73-02345 | 5A | W73-02424 | 4B | | W73-02503 | 2H |
| W73-02266 | 8D | W73-02346 | 2E . | W73-02425 | 5F | | W73-02504 | 2H |
| W73-02267 | 5F | W73-02347 | 4B | W73-02426 | 5F | | W73-02505 | 2H |
| W73-02268 | 4A | W73-02348 | 6B | W73-02427 | 5A | | W73-02506 | 2H |
| W73-02269 | 8A | W73-02349 | 5C | W73-02428 | 5C | | W73-02507 | 2H |
| W73-02270 | 4A | W73-02350 | 5D | W73-02429 | 5C | | W73-02508 | 2H |
| | 6G | W73-02351 | 5C | W73-02430 | 5F | | W73-02509 | 2H |
| W73-02271 | | | | | | | | |
| W73-02272 | 21 | W73-02352 | 5G | W73-02431 | 5G | | W73-02510 | 2H |
| W73-02273 | 5C | W73-02353 | 3F | W73-02432 | 5A | | W73-02511 | 2H |
| W73-02274 | 5C | W73-02354 | 6B | W73-02433 | 5C | | W73-02512 | 2H |
| W73-02275 | 5C | W73-02355 | 5B | W73-02434 | 5D | | W73-02513 | 2H |
| W73-02276 | 44 | W73-02356 | 5A | W73-02435 | 5C | | W73-02514 | 8C |
| | | | | | | | | |
| W73-02277 | 5C | W73-02357 | 6B | W73-02436 | 5A | 2000 | W73-02515 | 8C |
| W73-02278 | 5C | W73-02358 | 7C | W73-02437 | 7C | | W73-02516 | 4A |
| W73-02279 | 21 | W73-02359 | 5G | W73-02438 | 5B | | W73-02517 | 8A |
| W73-02280 | 5C | W73-02360 | 5G | W73-02439 | 5B | | W73-02518 | 8A |
| W73-02281 | SC | W73-02361 | 5G | W73-02440 | 5B | | W73-02519 | 4D |
| | 5G | | | | | and A | | |
| W73-02282 | | W73-02362 | 5D | W73-02441 | 3F | | W73-02520 | 5G |
| W73-02283 | 5G | W73-02363 | 6D | W73-02442 | 3F | | W73-02521 | 8A |
| W73-02284 | 6B | W73-02364 | 6E | W73-02443 | 5C | | W73-02522 | 8C |
| W73-02285 | 6C | W73-02365 | 6E | W73-02444 | 4A | | W73-02523 | 8A |
| W73-02286 | 5D | W73-02366 | 5G | W73-02445 | 2.1 | | W73-02524 | 8D |
| W73-02287 | 6B | W73-02367 | 6F | | 5A | | | 5G |
| | | | | W73-02446 | | | W73-02525 | |
| W73-02288 | 6F | W73-02368 | 6B | W73-02447 | 5C | | W73-02526 | 6E |
| W73-02289 | 6C | W73-02369 | 8G | W73-02448 | 5C | | W73-02527 | 6E |
| W73-02290 | 21 | W73-02370 | 8B | W73-02449 | 5C | | W73-02528 | 6E |
| W73-02291 | 6B | W73-02371 | 2C | W73-02450 | | | W73-02529 | 5G |
| W73-02292 | 6B | W73-02372 | 8E | W73-02451 | 5C | | W73-02530 | 5G |
| | | | | | | | 1110 00000 | |
| W73-02293 | 5D | W73-02373 | 4B | W73-02452 | 5C | | W73-02531 | 6E |
| W73-02294 | 4A | W73-02374 | 8E | W73-02453 | 5C | | W73-02532 | 6E |
| W73-02295 | 5G | W73-02375 | 4B | W73-02454 | 5C | | W73-02533 | 6E |
| W73-02296 | 5D | W73-02376 | 8B | W73-02455 | 5C | | W73-02534 | 5B |
| W73-02297 | 6B | W73-02377 | 8B | W73-02456 | SC. | | W73-02535 | 5D |
| | | | | | | | | |
| W73-02298 | 6C | W73-02378 | 8B | W73-02457 | 5C | | W73-02536 | 5G |
| W73-02299 | 6G | W73-02379 | 8B | W73-02458 | | | W73-02537 | 5D |
| W73-02300 | 6G | W73-02380 | 8G | W73-02459 | 5C | | W73-02538 | 5D |
| W73-02301 | 6G | W73-02381 | 8B | W73-02460 | | | W73-02539 | 5D |
| W73-02302 | 6G | | 7B | | | | | |
| | | W73-02382 | | W73-02461 | 5C | | W73-02540 | 6A |
| W73-02303 | 6G | W73-02383 | 8G | W73-02462 | 30 | | W73-02541 | 4A |
| W73-02304 | 6G | W73-02384 | 8C | W73-02463 | 5C | | W73-02542 | 5D |
| W73-02305 | 7B | W73-02385 | 8F | W73-02464 | 5C | | W73-02543 | 4B |
| W73-02306 | 8B | W73-02386 | 3B | W73-02465 | 5C | | W73-02544 | 44 |
| W73-02307 | 2K | W73-02387 | 8G | | | | | |
| | | | | W73-02466 | 5C | | W73-02545 | 2A |
| W73-02308 | 2F | W73-02388 | 8B | W73-02467 | 2.J | | W73-02546 | 3F |
| W73-02309 | 4B | W73-02389 | 8B | W73-02468 | 5C | | W73-02547 | 2A |
| W73-02310 | 2C | W73-02390 | 8G | W73-02469 | 5C | | W73-02548 | 5C |
| W73-02311 | 7C | W73-02391 | 8D | W73-02470 | 5C | | W73-02549 | 2H |
| W73-02312 | 8B | W73-02392 | 8B | W73-02471 | | | W73-02550 | 5G |
| | | | | | | | | |
| W73-02313 | 5A | W73-02393 | 8A | W73-02472 | 5C | | W73-02551 | 21 |
| W73-02314 | 2C | W73-02394 | 8B | W73-02473 | 5C | | W73-02552 | 5D |
| W73-02315 | 2J | W73-02395 | 8B | W73-02474 | 5C | | W73-02553 | 5D |
| W73-02316 | 4A | W73-02396 | 8G | W73-02475 | | | W73-02554 | 5D |
| W73-02317 | 7B | W73-02397 | 8E | W73-02476 | 5C | | W73-02555 | 5C |
| | | | | | | | | |
| W73-02318 | 7C | W73-02398 | 8B | W73-02477 | 5C | | W73-02556 | 5C |
| W73-02319 | 2.5 | W73-02399 | 4B | W73-02478 | | | W73-02557 | 2K |
| W73-02320 | 2K | W73-02400 | 4B | W73-02479 | 5C | | W73-02558 | 21 |
| W73-02321 | 8B | W73-02401 | 8G | W73-02480 | 2F | | W73-02559 | 5B |
| W73-02322 | 8B | W73-02402 | 8G | W73-02481 | 2L | | W73-02560 | 6E |
| | 2E | | | | 7C | | | |
| W73-02323 | | W73-02403 | 8G | W73-02482 | | | W73-02561 | 6E |
| W73-02324 | 7C | W73-02404 | 8G | W73-02483 | | | W73-02562 | 3E |
| W73-02325 | 2E | W73-02405 | 8G | W73-02484 | 5B | | W73-02563 | 8B |
| W73-02326 | 7C | W73-02406 | 8E | W73-02485 | 5G | | W73-02564 | 23 |
| W73-02327 | 7C | W73-02407 | 8G | W73-02486 | 2C | | W73-02565 | 8I |
| W73-02328 | 8G | W73-02408 | 8F | W73-02487 | 2J | | W73-02566 | 2A |
| W73-02328 | 4Å | W73-02409 | 8G | W73-02488 | 21 | 10.41 | W73-02567 | 4C |
| | 77 | 10.40 | | | | | | |
| W73-02330 | 4A | W73-02410 | 8B | W73-02489 | | | W73-02568 | 2B |
| W73-02331 | 4A | W73-02411 | 5F | W73-02490 | | | W73-02569 | 21 |
| W73-02332 | 2E | W73-02412 | 4B | W73-02491 | | | W73-02570 | 2L |
| W73-02333 | 44 | W73-02413 | 5B | W73-02492 | | | W73-02571 | 8I |
| | 4A | | 8C | W73-02493 | | | | |
| W73-02334 | au | W73-02414 | | | | | W73-02572 | 81 |
| W73-02335 | 4A | W73-02415 | | W73-02494 | | | W73-02573 | 4C |
| W73-02336 | 4A | W73-02416 | 8B | W73-02495 | | | W73-02574 | 81 |
| W73-02337 | 4A | W73-02417 | 8B | W73-02496 | | | W73-02575 | 81 |
| W73-02338 | 2E | W73-02418 | 4B | W73-02497 | | | W73-02576 | 8I |
| W73-02339 | 2G | W73-02419 | 8G | W73-02498 | 2H | 614-19 | W73-02577 | 2H |
| W73-02340 | 2F | | 8G | W73-02490 | 2D | | | 2H |
| | ** | W73-02420 | 7.7 | | | | W73-02578 | |
| W73-02341 | 5B | W73-02421 | 8F | W73-02500 | 5C | | W73-02579 | 4A |
| | | | | | | | | |

W73-02580 81 W73-02581 2L W73-02582 2I W73-02583 2C W73-02584 5A W73-02585 5C W73-02586 2H W73-02587 2L W73-02588 2K W73-02589 4C W73-02590 2H W73-02591 2H W73-02592 5C W73-02593 4A W73-02594 5C W73-02595 5C W73-02596 2H W73-02597 5C W73-02598 7B W73-02599 2L W73-02600 4A

.

.

Source

A. C

Ва

В

N

U

U

U

Û1

ABSTRACT SOURCES

| ource | Accession Number | Total |
|--|---|-------|
| The second | | |
| . Centers of Competence | | |
| American Water Works Association Research Foundation, Public Water Supply Treatment Technology | W73-02085 02086 02089 02091 02125 02127 02129 02132 02135 02139 02141 02144 02148 02425 02432 02534 02539 | 36 |
| Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants | W73-02012 02014 — 02015 02017 — 02019 02021 — 02024 02027 — 02032 02095 — 02103 02105, 02124 02436 | 28 |
| Bureau of Reclamation, Engineering Works | W73-02068 02070 02072 02080 | 12 |
| Cornell University, Policy, Models for Water Resources Systems | W73-02540 02547 | 8 |
| National Water Well Association, Water Well Construction Technology | W73-02108 — 02110 02369 — 02424 | 59 |
| University of Florida, Eastern U. S. Water Law | W73-01978 — 01996 02230 — 02248 02250 — 02271 02514 02533 | 80 |
| University of Texas, Wastewater Treatment and Management | W73-02187 — 02188 02190 — 02192 02194 02196 — 02198 02200 02202 — 02216 02218 — 02229 02434 | 38 |
| University of Washington, Water Quality Requirements for Aquatic Organisms | W73-01976 01977 02273 02275 02277 02278 02280 02281 02433 | 10 |
| University of Wisconsin, Water Resources Economics | W73-02282 02289 02291 02293 02295 02304 | 21 |
| University of Wisconsin, Eutrophication | W73-02084, 02092 02351 02443 — 02444 02446 — 02447 02449 — 02457 02459 | 36 |
| | 02461 02479 | |

ABSTRACT SOURCES

Sou

c.

| Source | 3 | Accession Number | Total |
|---|---|--|-------|
| A. Centers of Competence (cont'd) | | | |
| U.S. Geological Survey, Hydrology | | W73-01960 01961 01972 01974 02033 02054 02057 02067 | 141 |
| | | 02106 - 02107 02149 - 02159 02162 | |
| | 5 | 02165 02168 02170 02183 02185 02186 | |
| | | 02305 - 02315 02317 - 02341 02437 | |
| | | 02480 02498 02501 02513 | |
| B. State Water Resources Research Institutes | | | |
| Alaska Institute for Water Research | | W73-02122 | 1 |
| Arizona Water Resources Research Center | | W73-02342 02438 02440 | 4 |
| Connecticut Institute of Water Resources | | W73-02343 02346 02548 | 5 |
| Florida Water Resources Research Center | | W73-02549 | 1 |
| Georgia Environmental Resources Center | | W73-01953 01955 | 3 |
| Hawaii Water Resources Research Center | | W73-02347 | 1 |
| Indiana Water Resources Research Center | | W73-01951 01952 02348 | 3 |
| Iowa State Water Resources Research Institute | | W73-02550 | 1 |
| Kansas Water Resources Research Institute | | W73-02552 02554 | 3 |
| Louisiana Water Resources Research Institute | | W73-01956 | 1 |
| Michigan Institute of Water Research | | W73-02111 | 1 |
| Minnesota Water Resources Research Center | | W73-01966 01969 02441 02442 02555 02556 | 8 |
| Missouri Water Resources Research Center | | W73-02557 | 1 |
| Montana Water Resources Research Center | | W73-02112 02114 02558 02559 | 5 |
| Nebraska Water Resources Research Institute | | W73-02349 | 1 |
| New Hampshire Water Resources Research Center | | W73-02116 | 1 |
| New Jersey Water Resources Research Institute | | W73-01962 02350。02352 02435 | 4 |
| New Mexico Water Resources Research Institute | | W73-01963, 02117 | 2 |
| North Carolina Water Resources Research Institute | | W73-02115 02353 02361 | 10 |

ABSTRACT SOURCES

| Source | Accession Number | Total |
|---|---|-------|
| B. State Water Resources Research Institutes (cont'd) | | |
| Ohio Water Resources Center | W73-01957 01958 | 2 |
| Oklahoma Water Resources Research Institute | W73-02118 | 1 |
| Oregon Water Resources Research Institute | W73-02560 02561 | 2 |
| Rhode Island Water Resources Center | W73-01959 02119 02120 | 3 |
| Tennessee Water Resources Research Center | W73-02562 | 1 |
| Utah Center for Water Resources Research | W73-02121 | 1 |
| Virginia Water Resources Research Center | W73-01964, 02362 02563 | 3 |
| Wisconsin Water Resources Center | W73-01965 | 1 |
| C. Other | | |
| BioSciences Information Service | W73-01997 — 02011 02013, 02016 02020 02025 — 02026 02055 — 02026 02071 02087 — 02088 02090 02093 — 02094 02104, 02123 02128 02133 — 02134 02140 02142 — 02143 02160 — 02161 02163 — 02164 02169, 02184 02189, 02193 02195, 02199 02201, 02217 02249, 02272 02276, 02279 02290, 02294 02316, 02445 02448, 02458 02460, 02499 — 02500 02551 02564 — 02600 | 99 |
| Environmental Protection Agency | W73-01975 | 1 |
| National Water Commission | W73-02363 02368 | 6 |
| Office of Saline Water | W73-02081 02083 | 3 |
| Office of Water Resources Research | W73-01970 01971 | 2 |

| the management of the same of |
|-------------------------------|
| |
| |
| |
| |
| |



| 3 |
|---|
| |
| |
| |
| |
| |

| | | • | |
|--|--|---|--|
| | | | |



| daundy domain | |
|---------------|--|
| 10/1/2 | |
| | |
| | |

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- ► Ground and surface water hydrology at the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- ▶ Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- ▶ Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- ▶ Water resources economics at the Water Resources Center of the University of Wisconsin.
- ▶ Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- ▶ Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- ▶ Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- ▶ Water well construction technology at the National Water Well Association.
- ▶ Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- ▶ Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- ▶ Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- ▶ Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- ► Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- ▶ Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- ▶ Water treatment plant waste pollution control at American Water Works Association.
- ▶ Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

NATURE OF WATER

WATER CYCLE

WATER SUPPLY AUGMENTATION AND CONSERVATION

WATER QUANTITY MANAGEMENT AND CONTROL

WATER QUALITY MANAGEMENT AND PROTECTION

WATER RESOURCES PLANNING

RESOURCES DATA

ENGINEERING WORKS

MANPOWER, GRANTS, AND **FACILITIES**

SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES



POSTAGE AND FEES PAID DEPARTMENT OF COMMERCE 50

SWRA

X730430
ENVIRONMENTAL PROTECTION AGENCY
2200 CHURCHILL ROAD
WILBUR N PALMQUIST
SPRINGFIELD IL 62706
SPRINGFI IN DECTION AGE TO

AN EGUAL OPPORTUNITY EMPLOYER

U.S. DEPARTMENT OF COMMERCE National Technical Information Service Pringfield, vs. 22151

PRINTED MATTER

FFICIAL BUBINESS

